

**EPA Superfund  
Record of Decision:**

**IDAHO NATIONAL ENGINEERING LABORATORY  
(USDOE)  
EPA ID: ID4890008952  
OU 10  
IDAHO FALLS, ID  
07/14/2000**



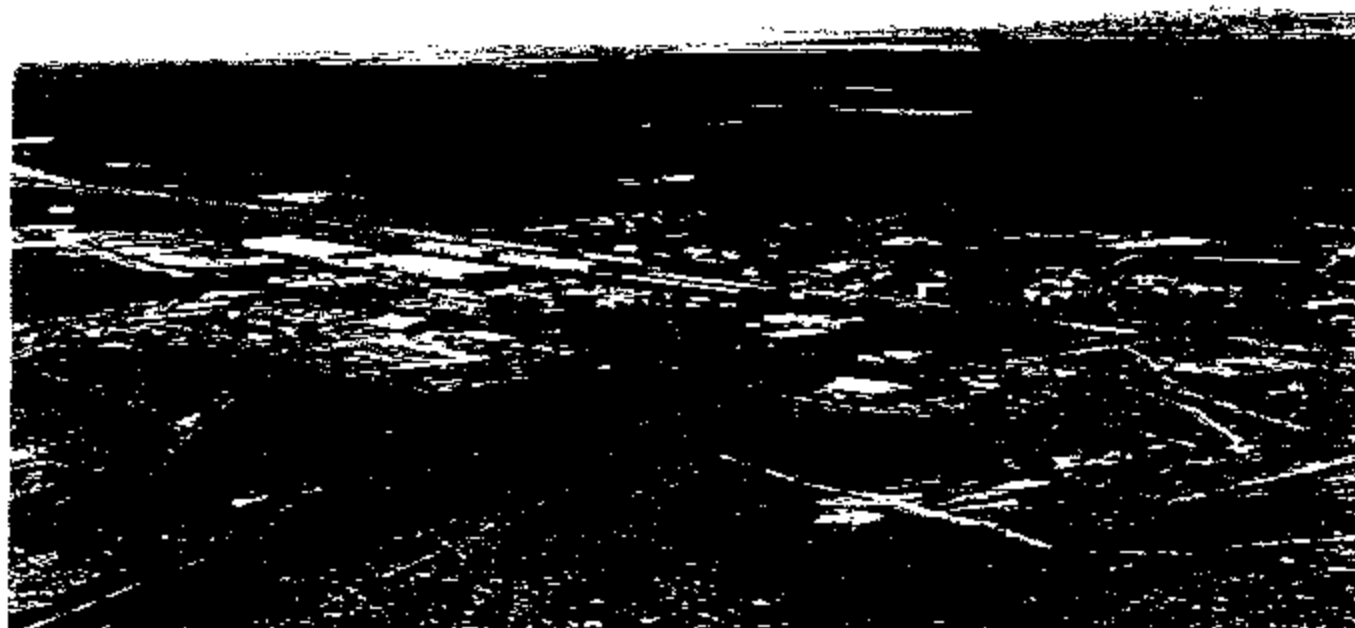
IDAHO DEPARTMENT  
OF HEALTH AND  
WELFARE

DIVISION OF  
ENVIRONMENTAL  
QUALITY

---

# Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13

---



Idaho National Engineering and Environmental Laboratory  
Idaho Falls, Idaho

**DOE/ID-10719**  
**Revision 2**

**Final Comprehensive  
Record of Decision  
Central Facilities Area  
Operable Unit 4-13**

**Published July 2000**

**Idaho National Engineering and Environmental Laboratory  
Idaho Falls, Idaho**

## U.S. DEPARTMENT OF ENERGY IDAHO OPERATIONS OFFICE SIGNATURE SHEET

Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, the Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.


*Beverly A Cook*  
Beverly A. Cook, Manager  
U.S. Department of Energy Idaho Operations Office

*7/31/00*

Date

## U.S. ENVIRONMENTAL PROTECTION AGENCY SIGNATURE SHEET

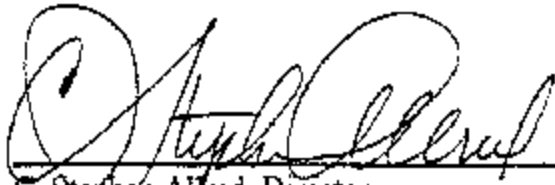
Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

  
for \_\_\_\_\_  
Chuck Clarke, Regional Administrator  
Region 10  
U.S. Environmental Protection Agency

7-14-00  
Date

**IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY  
SIGNATURE SHEET**

Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, the Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Environmental Quality.

A handwritten signature in black ink, appearing to read "C. Stephen Alfred", is written over a horizontal line.

C. Stephen Alfred, Director  
Department of Environmental Quality

7-18-2000

Date

## **U.S. DEPARTMENT OF ENERGY IDAHO OPERATIONS OFFICE SIGNATURE SHEET**

Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, the Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

---

Beverly A. Cook, Manager  
U.S. Department of Energy Idaho Operations Office

Date

## **U.S. ENVIRONMENTAL PROTECTION AGENCY SIGNATURE SHEET**

Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

---

Chuck Clarke, Regional Administrator  
Region 10  
U.S. Environmental Protection Agency

Date

## **IDAHO DEPARTMENT OF HEALTH AND WELFARE SIGNATURE SHEET**

Signature sheet for the Record of Decision for OU 4-13, located in Waste Area Group 4, the Central Facilities Area, of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

---

C. Stephen Allred, Administrator  
Division of Environmental Quality  
Idaho Department of Health and Welfare

Date

# PART I—DECLARATION OF THE RECORD OF DECISION

## Site Names and Location

Central Facilities Area

Waste Area Group 4 Comprehensive Remedial Investigation/Feasibility Study, Operable Unit 4-13

Incorporating 52 individual sites in Operable Units 4-1 through 4-13

Idaho National Engineering and Environmental Laboratory

CERCLIS ID No. 4890008952; CERCLA Site ID No. 1000305

Idaho Falls, Idaho

## Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedy for Waste Area Group (WAG) 4 at the Idaho National Engineering and Environmental Laboratory (INEEL). The selected remedy comprises remedial action at three individual sites and outlines limited action institutional controls that will be implemented at one of the remediated sites and one other site. Components of the selected remedy were selected in accordance with the requirements of the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) and the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) (42 USC 9601, et seq.) of 1980 as amended by the *Superfund Amendments and Reauthorization Act of 1986*. All documentation to support the decisions finalized in this ROD is contained in the Administrative Record for WAG 4. The selected remedy is intended to be the final action at WAG 4, the Central Facilities Area (CFA).

The U.S. Department of Energy Idaho Operations Office (DOE-ID) is lead agency for the decision. The U.S. Environmental Protection Agency (EPA), Region 10 and Idaho Department of Health and Welfare (IDHW) Division of Environmental Quality participated in the evaluation and selection of the remedial actions. The EPA approves and IDHW concurs with the selected remedy for WAG 4.

Although no unacceptable risks via groundwater were identified in the *Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13* (RI/FS) (DOE-ID 1999a), a subsequent report for the Operable Unit (OU) 4-12 Post-ROD monitoring program identified that nitrate in two wells at WAG 4 was above a federal drinking water maximum contaminant level (MCL) of 10 mg/L. On this basis, the Agencies initially decided to separate OU 4-13 into two actions: OU 4-13A, which was designated an Interim Action ROD, and OU 4-13B, which was designated as the groundwater RI/FS. Therefore, the proposed plan for OU 4-13 was retitled the *OU 4-13A Interim Action Proposed Plan* when it was issued in August 1999.

Subsequent to this decision, information was gathered regarding the likely source and extent of nitrate in the wells. The most likely source has been identified as the CFA-08 Sewage Plant Drainfield. Additionally, because the nitrate levels are expected to drop below the MCL during the time period that DOE operates the facility, a higher allowable level under 40 CFR 141.11 for nitrate (20 mg/L) is protective during the DOE operational period. The average nitrate concentration in one of the subject wells is equal to the MCL; nitrate concentrations in the other well is less than the 20 mg/L allowable level and shows a downward trend. On that basis, the agencies decided to eliminate the OU 4-13B RI/FS and maintain the original name, the OU 4-13 Comprehensive ROD. Groundwater will continue to be evaluated under the Post-ROD monitoring program.

## Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such release or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

### Description of the Selected Remedies

The Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991) was developed to provide a framework and schedule for implementing CERCLA activities at the INEEL. The FFA/CO was signed by DOE-ID, EPA Region 10, and the IDHW. To facilitate the implementation of CERCLA at INEEL, the INEEL was divided into 10 WAGs. This ROD documents remedies selected for contaminated sites at WAG 4.

WAG 4 consists of 52 surface sites grouped into 13 operable unit (OUs). As designated in the FFA/CO, OU 4-13 is the *Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13* (DOE-ID 1999a). An estimate of cumulative risk associated with all 52 surface sites and an evaluation of appropriate actions for those sites posing unacceptable risk was included in the OU 4-13 RI/FS. Forty-seven of these sites were determined to be no action or no further action sites (this includes a no action portion of one site, CFA-08). The selected remedies for WAG 4 comprise three remedial actions to mitigate the risk associated with three sites (one of which will require continuing institutional controls). Also limited action is required at the no further action site, CFA-07, and three previously covered sites, CFA-01, -02, and -03, to implement and continue institutional controls. Monitoring of groundwater is required to assess the downward trend of nitrate. The sites that require remedial action are the CFA-04 Pond, the CFA-08 Sewage Plant Drainfield, and CFA-10 Transformer Yard (formerly known as the Transformer Yard Oil Spills Site).

#### CFA-04 Pond

The CFA-04 Pond was determined to pose a threat to human health and the environment from mercury contamination. The hazard indices are 80 for human (future resident with subsistence farming) and up to 30,000 for ecological receptors (screening level). The volume of mercury-contaminated soil is estimated to be 6,338 m<sup>3</sup> (8,290 yd<sup>3</sup>). This estimate is based on the depth to basalt in the pond bottom (max=2.4 m [8 ft]), the windblown area, and the pipeline. The remedial action selected to mitigate the threat to human health and the environment for the CFA-04 Pond is excavation and on-INEEL disposal at the proposed INEEL CERCLA Disposal Facility (ICDF). Given the volume of contaminated soil, the cost of retrieval and associated cost of disposal is more cost effective than a more intensive analysis. This remedy will consist of the following actions:

1. Characterizing the site and excavating soil from CFA-04 that exceeds the mercury final remediation goal (FRG) of 0.50 mg/kg. Soil contaminated at concentrations above the FRG will be excavated to basalt or 3m (10ft) below ground surface (bgs). No basalt will be excavated.
2. Transporting and disposing soil that exceeds the mercury FRG to the ICDF.
3. Stabilizing soil as necessary to meet ICDF Waste Acceptance Criteria.

4. Performing verification sampling to ensure that soil exceeding the FRG of 0.50 mg/kg mercury has been removed.
5. Backfilling the pond, and adjacent areas that have been excavated with uncontaminated soil to grade. All excavations will be contoured to match the surrounding terrain and revegetated.

The preamble of the NCP states that when noncontiguous facilities are reasonably close to one another, and wastes at the sites are compatible for a selected treatment or disposal approach, CERCLA section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes; and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. CFA and Idaho Nuclear Technology and Engineering Center (INTEC) will be treated as one site for response purposes because of the reasonably close proximity of the facilities and because of the compatibility of the disposal approach. Both facilities are part of INEEL. INTEC is located just two miles north of CFA and the facilities are connected by a road limited only to badged personnel. The ICDF is being designed to safely consolidate INTEC CERCLA waste and will accept CERCLA waste from other areas within INEEL. The ICDF complex will include an engineered facility meeting Resource Conservation and Recovery Act Subtitle C, Idaho Hazardous Waste Management Act and polychlorinated biphenyl landfill design and construction requirements.

## **CFA-08 Sewage Plant Drainfield**

The CFA-08 Sewage Plant Drainfield was determined to pose a threat to humans from cesium-137 contamination. The risk to the future residential receptor from cesium-137 is 4E-04. No environmental risks were identified. The volume of cesium-137 contaminated soil is estimated to be 56,634 m<sup>3</sup> (74,074 yd<sup>3</sup>). Radioactive decay will reduce the cesium-137 concentration to below the 1E-04 (future resident) risk-based level of 2.3 pCi/g in 189 years. The remedial action selected to mitigate the threat to human health for the CFA-08 Sewage Plant Drainfield is containment of the contaminated soil area using an engineered cover. The cover will be designed to isolate low-level radioactive contaminants from human and biotic intrusion and to provide radiation shielding for a period of 189 years. Short-term remedial actions to be performed at the site include:

1. Constructing an engineered Evapotranspiration (ET) cover, using clean native soil for fill material as needed
2. Contouring and grading the surrounding terrain to direct the surface water runoff away from the cover.

The continued effectiveness of the remedy will be evaluated by monitoring soil cover integrity and performing above ground radiological surveys. Because contamination is to be left in place, institutional controls are necessary for CFA-08 to restrict access until the land can be released for unrestricted use. Institutional controls (Section 12) to be implemented at CFA-08 include:

1. Restricting access using signs and permanent markers
2. Establishing and publishing surveyed boundaries
3. Controlling activities
4. Land use controls in land leasing and property transfers.

## **CFA-10 Transformer Yard**

Due to lead contamination, CFA-10 Transformer Yard was determined to pose a threat to human health and the environment. Lead was detected in soil at a maximum concentration of 5,560 mg/kg, which exceeds the EPA residential screening criterion of 400 mg/kg and the ecological risk level of 10 times background (170 mg/kg). The relatively small volume of lead-contaminated soil is estimated at 122 m<sup>3</sup> (160 yd<sup>3</sup>). The remedial action selected to mitigate the threat to human health and the environment for the CFA-10 Transformer Yard site is excavation and off-INEEL disposal at a permitted Treatment, Storage, and Disposal Facility (TSDF). This remedy will consist of the following actions:

1. Characterizing the site and excavating soil from CFA-10 (OU4-09) that exceeds the lead FRG of 400 mg/kg.
2. Performing verification sampling in the excavated area to verify that soil exceeding the FRG of 400 mg/kg for lead, has been removed.
3. Stabilizing in cement, soil as necessary to ensure LDRs are met.
4. Transporting and disposing of excavated and stabilized soil to a permitted off-INEEL TSDF.
5. Backfilling areas that have been excavated with uncontaminated soil to grade. All excavations will be contoured to match the surrounding terrain and revegetated.

## **Statutory Determination**

### **Statutory Requirements**

The selected remedies for the CFA-04 Pond, CFA-08 Sewage Drainfield, CFA-10 Transformer Yard, No Action and No Further Action sites have been determined to protect human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate, and are cost-effective. These remedies use permanent solutions and alternative treatment technologies to the maximum extent practicable.

### **Statutory Preference for Treatment**

The statutory preference for a remedy to reduce the toxicity, mobility, or volume of materials through treatment is met by the selected remedies for CFA-04 and CFA-10. Treatment will be performed by stabilizing excavated, contaminated soil as appropriate to meet the ICDF Waste Acceptance Criteria for CFA 04 and the LDRs for CFA 10.

The Agencies have decided to implement engineering controls in cases where treatment is impractical or where sites pose relatively low long-term risk. Treating contaminated soils at CFA-08 is not practical due to the large volume of soil contaminated with relatively low levels of cesium-137. The selected remedial action at CFA-08 does not meet the preference for treatment as a principal element. However, the selected remedies fulfill the Agencies preference for engineered controls in lieu of treatment.

### **Institutional Controls**

Institutional controls (IC) or land use/access restriction will be maintained by DOE at any INEEL CERCLA site where residual contamination levels are not protective for unrestricted exposure and unlimited land use according to EPA Region 10 Policy (EPA 1999a). ICs may be discontinued if

contaminant conditions or potential risk levels are determined to be protective which will be documented during CERCLA five-year reviews.

## **Five-Year Review Requirements**

Statutory comprehensive five-year reviews are required at sites where contamination left in place precludes unrestricted exposure and unlimited land use. Reviews will evaluate factors such as contaminant migration from sites, effective use of institutional controls, and the overall effectiveness of remedial actions. Also, reviews will assess the need for future long-term environmental monitoring and administrative/institutional controls.

## RECORD OF DECISION DATA CERTIFICATION CHECKLIST

Based on Section 6.2.6 of *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 1999b), the following information is included in the Decision Summary (Part II) of this ROD:

- Contaminants of concern (COCs) and their respective concentrations
- Baseline risk assessment of the COCs
- Cleanup levels established for the COCs and the basis for the levels
- Information about principal threat wastes is not included because source materials constituting principal threats were not encountered
- Current and future land- and groundwater-use assumptions used in the baseline risk assessment and ROD
- Land and groundwater use that will be available at the Site as a result of the selected remedies
- Estimated costs for capital, operation and maintenance, and total net present value; discount rate; and the number of years over which the remedy estimates are projected
- Decisive factors that led to selecting the remedies (i.e., how the selected remedies provide the best balance of tradeoffs relative to the balancing and modifying criteria).

Supporting information on the decision process can be found in the Administrative Record for WAG

4.

# CONTENTS

PART I. DECLARATION OF THE RECORD OF DECISION .....	iii
Site Names and Location .....	iii
Statement of Basis and Purpose .....	iii
Assessment of the Site .....	iv
Description of the Selected Remedies .....	iv
Statutory Determination .....	vi
RECORD OF DECISION DATA CERTIFICATION CHECKLIST .....	viii
U.S. DEPARTMENT OF ENERGY IDAHO OPERATIONS OFFICE SIGNATURE SHEET .....	ix
U.S. ENVIRONMENTAL PROTECTION AGENCY SIGNATURE SHEET .....	xi
IDAHO DEPARTMENT OF HEALTH AND WELFARE SIGNATURE SHEET .....	xiii
ACRONYMS .....	xxiii
PART II—DECISION SUMMARY .....	1-1
1.    SITE NAME, LOCATION, AND BRIEF DESCRIPTION .....	1-1
2.    SITE HISTORY AND ENFORCEMENT ACTIVITIES .....	2-1
2.1 INEEL History .....	2-1
2.2 CFA History .....	2-1
2.3 WAG 4 Enforcement Activities .....	2-1
2.3.1 CERCLA Actions .....	2-2
3.    HIGHLIGHTS OF COMMUNITY PARTICIPATION .....	3-1
4.    SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION .....	4-1
4.1 Remedial Action Sites .....	4-1
4.2 No Action and No Further Action Sites .....	4-1
4.3 Groundwater .....	4-4
5.    SITE CHARACTERISTICS .....	5-1

5.1	Physical Characteristics	5-1
5.2	Climate	5-2
5.3	Flora and Fauna	5-2
5.4	Demography	5-3
5.5	Cultural Resources	5-3
5.6	Conceptual Site Models	5-5
6.	CURRENT AND POTENTIAL SITE AND RESOURCE USES	6-1
6.1	Current Land Use	6-1
6.2	Future Land Use	6-1
6.3	Groundwater Use	6-3
6.4	Groundwater Classification and Basis	6-3
7.	BASELINE RISK ASSESSMENT METHODOLOGY	7-1
7.1	Human Health Risk Evaluation Summary	7-1
7.1.1	Data Evaluation	7-1
7.1.2	Exposure Assessment	7-2
7.1.3	Toxicity Assessment	7-4
7.1.4	Risk Characterization	7-5
7.1.5	Qualitative Uncertainty Analysis	7-7
7.2	Ecological Risk Evaluation Summary	7-12
7.2.1	Problem Formulation	7-12
7.2.2	Analysis	7-12
7.2.3	Risk Characterization	7-15
7.2.4	Transition to the INEEL-Wide Ecological Risk Assessment	7-16
7.3	Risk Assessment Summary	7-16
8.	CONTAMINATED SOIL SITES CFA-04, CFA-08, AND CFA-10	8-1
8.1	CFA-04 Pond (OU 4-05)	8-1

8.1.1	Site Investigations	8-1
8.1.2	Nature and Extent of Contamination	8-2
8.1.3	Summary of Site Risks	8-2
8.2	CFA-08 Sewage Plant Drainfield (OU 4-08)	8-4
8.2.1	Site Investigations	8-4
8.2.2	Nature and Extent of Contamination	8-6
8.2.3	Summary of Site Risks	8-6
8.3	CFA-10 Transformer Yard (OU 4-09)	8-7
8.3.1	Site Investigations	8-7
8.3.2	Nature and Extent of Contamination	8-7
8.3.3	Summary of Site Risks	8-7
9.	REMEDIAL ACTION OBJECTIVES AND FINAL REMEDIATION GOALS	9-1
9.1	Remedial Action Objectives	9-1
9.2	Final Remediation Goals for the Selected Alternatives	9-1
10.	DESCRIPTION OF ALTERNATIVES	10-1
10.1	Alternative 1—No Action (With Monitoring)	10-1
10.2	Alternative 2—Limited Action	10-1
10.3	Alternative 3—Excavation, Treatment, and Disposal	10-2
10.3.1	Alternative 3a—Removal, On-INEEL Treatment, and Disposal	10-2
10.3.2	Alternative 3b—Removal, Treatment, and Disposal Off-INEEL	10-3
10.4	Alternative 4—Containment and Institutional Controls	10-4
11.	SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES	11-1
11.1	Threshold Criteria	11-1
11.1.1	Overall Protection of Human Health and the Environment	11-1
11.1.2	Compliance with Applicable or Relevant and Appropriate Requirements	11-2
11.2	Balancing Criteria	11-3

11.2.1	Long-Term Effectiveness and Permanence	11-3
11.2.2	Reduction of Toxicity, Mobility, or Volume Through Treatment	11-3
11.2.3	Short-Term Effectiveness	11-4
11.2.4	Implementability	11-4
11.2.5	Cost	11-5
11.3	Modifying Criteria	11-5
11.3.1	State Acceptance	11-5
11.3.2	Community Acceptance	11-6
12.	SELECTED REMEDY	12-1
12.1	Description of Selected Remedy	12-1
12.1.1	CFA-04 Pond (OU 4-05)	12-1
12.1.2	CFA-08 Sewage Plant Drainfield (OU 4-08)	12-2
12.1.3	CFA-10 Transformer Yard (OU4-09)	12-3
12.2	Institutional Controls	12-4
12.3	Estimated Costs for the Selected Remedies	12-6
13.	STATUTORY DETERMINATIONS	13-1
13.1	CFA-04 Pond	13-1
13.1.1	Protection of Human Health and the Environment	13-1
13.1.2	Cost-Effectiveness	13-1
13.1.3	Use of Permanent Solutions and Alternative Treatment Technologies	13-1
13.1.4	Preference for Treatment as a Principal Element	13-1
13.1.5	Five-Year Reviews	13-4
13.2	CFA-08 Sewage Plant Drainfield (OU 4-08)	13-4
13.2.1	Protection of Human Health and the Environment	13-4
13.2.2	Cost-Effectiveness	13-4
13.2.3	Use of Permanent Solutions and Alternative Treatment Technologies	13-4

13.2.4	Preference for Treatment as a Principal Element	13-5
13.2.5	Five-Year Reviews	13-5
13.3	CFA-10 Transformer Yard (OU 4-09)	13-5
13.3.1	Protection of Human Health and the Environment	13-5
13.3.2	Cost-Effectiveness	13-5
13.3.3	Use of Permanent Solutions and Alternative Treatment Technologies	13-5
13.3.4	Preference for Treatment as a Principal Element	13-6
13.3.5	Five-Year Reviews	13-6
14.	DOCUMENTATION OF SIGNIFICANT CHANGES	14-1
14.1	Modification of the Preferred Alternative for CFA-08	14-1
14.2	CFA-04 Information	14-1
14.3	OU 4-13A Interim Action Proposed Plan	14-1
14.4	Ecological Sites and Risks	14-2
15.	REFERENCES	15-1
Part III.	RESPONSIVENESS SUMMARY	III-1-1
Appendix A—Oral and Written Public Comments		

## FIGURES

1-1.	Location of WAG 4 at the INEEL	1-2
1-2.	CERCLA sites and groundwater monitoring wells at WAG 4	1-3
5-1.	Counties surrounding the INEEL	5-4
5-2.	Conceptual site model for contaminated soil sites at CFA	5-6
5-3.	Conceptual site model for underground storage tanks and buried waste sites at CFA	5-7
5-4.	Conceptual site model for liquid discharge sites at CFA	5-8
5-5.	Complete conceptual site model for ecological receptors at WAG 4	5-9
6-1.	Land ownership distribution in the vicinity of the INEEL and on-INEEL areas open for permitted grazing	6-2

8-1.	Pond (CFA-04) . . . . .	8-3
8-2.	Sewage Plant Drainfield (CFA-08) . . . . .	8-5
8-3.	The Transformer Yard site (CFA-10) . . . . .	8-8

## TABLES

4-1.	Summary of WAG 4 Sites . . . . .	4-2
7-1.	BRA human health assessment uncertainty factors . . . . .	7-8
7-2.	Summary of source-term uncertainties site with selected remedies . . . . .	7-11
7-3.	Sources and effects of uncertainties in the ecological risk assessment . . . . .	7-17
7-4.	Summary of major risks and hazard quotients at individual sites and contaminants of concern that are addressed by the selected remedy for WAG 4 . . . .	7-18
8-1.	Summary data for the human health and ecological COC at the CFA-04 Pond . . . . .	8-2
8-2.	Summary of data for human health COCs at the CFA-08 drainfield . . . . .	8-6
8-3.	Summary of data for the human health and ecological COCs at the CFA-10 Transformer Yard . . . . .	8-9
9-1.	Final Remediation Goals for sites with selected alternatives . . . . .	9-2
11-1.	Relative ranking of alternatives evaluated for the three WAG 4 OU 4-13 sites of concern. <sup>a</sup> . . . . .	11-2
11-2.	Costs for the alternatives considered for CFA-04, CFA-08, and CFA-10. . . . .	11-6
12-1.	Institutional control evaluation for WAG 4 sites. . . . .	12-8
12-2.	Institutional control requirements for WAG 4 remediated sites . . . . .	12-18
12-3.	Cost estimate summary for selected remedy at OU 4-13: Pond (CFA-04), SP Drainfield (CFA-08), and Transformer Yard (CFA-10). . . . .	12-22
13-1.	ARARs and TBCs for the selected remedies for CFA-04, CFA-08, and CFA-10. . . . .	13-2

## ACRONYMS

ALARA	as low as reasonably achievable
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirements
ASA	Auditable Safety Analysis
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BRA	baseline risk assessment
CAB	Citizen's Advisory Board
CEL	Chemical Engineering Laboratory
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFA	Central Facilities Area
CFLUP	Comprehensive Facility Land Use Plan
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	contaminant of potential concern
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
FFA/CO	Federal Facility Agreement and Consent Order
FRG	final remediation goals
GFE	government furnished equipment
HI	hazard index

HQ	hazard quotient
HSP	Health and Safety Plan
IC	Institutional control
ICDF	INEEL CERCLA Disposal Facility
ICP	Institutional Control Plan
IDAPA	Idaho Administrative Procedures Act
IDHW	Idaho Department of Health and Welfare
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho National Technical and Engineering Center
IRIS	Integrated Risk Information System
LOAEL	lowest observed adverse effects level
MCL	maximum contaminant level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no observed adverse effects level
NPL	National Priorities List
NPV	net present value
NRTS	National Reactor Testing Station
UCL	upper confidence limits
O&M	operation and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
RAO	remedial action objective
RBC	risk based concentration

RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SF	slope factor
SGS	segmented gate separation
SP	sewage plant
SRPA	Snake River Plain Aquifer
TBC	to-be-considered
TCLP	Toxicity Characteristic Leaching Procedure
TRV	toxicity reference value
TSDF	Treatment, Storage, and Disposal Facility
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
WAG	Waste Area Group



## **PART II—DECISION SUMMARY**

### **1. SITE NAME, LOCATION, AND BRIEF DESCRIPTION**

Waste Area Group (WAG) 4 is designated as one of 10 WAGs located at the Idaho National Engineering and Environmental Laboratory (INEEL). The INEEL has conducted nuclear reactor research and testing for the U.S. Government since 1949. It is managed by the U.S. Department of Energy Idaho Operations Office (DOE-ID) and occupies an area of approximately 2,305 km<sup>2</sup> (890 mi<sup>2</sup>) in southeastern Idaho. WAG 4 comprises the Central Facilities Area (CFA), located in the south-central portion of the INEEL (see Figure 1-1).

A Federal Facility Agreement/Consent Order (FFA/CO) (DOE-ID 1991) between the U.S. Environmental Protection Agency (EPA) Region 10, the State of Idaho Department of Health and Welfare (IDHW), and the DOE-ID is the procedural framework for administering the INEEL's 10-WAGs for environmental restoration activities. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42USC 9601, et seq.) site identification number for the INEEL is 1000305.

The CFA has been used since 1949 to house many of the support services for all of the operations at the INEEL, including laboratories, security, fire protection, medical, communication systems, warehouses, a cafeteria, vehicle and equipment pools, bus system, and laundry facilities. The FFA/CO identified 52 potential release sites at WAG 4 (see Figure 1-2). The types of CERCLA sites at WAG 4 include landfills, underground storage tanks, above ground storage tanks, drywells, disposal ponds, soil contamination sites, and a sewage plant. Each of these sites was placed into one of 13 operable units (OUs) within the WAG based on similarity of contaminants, environmental release pathways, and/or investigations.

DOE-ID is the lead agency for the decisions presented in this Record of Decision (ROD). The EPA Region 10 and the IDHW participated in the evaluation and selection of remedies at WAG 4. The EPA approves decisions and IDHW concurs with the selected remedies. Both EPA and IDHW participated in the evaluation and selection of remedies for WAG 4.

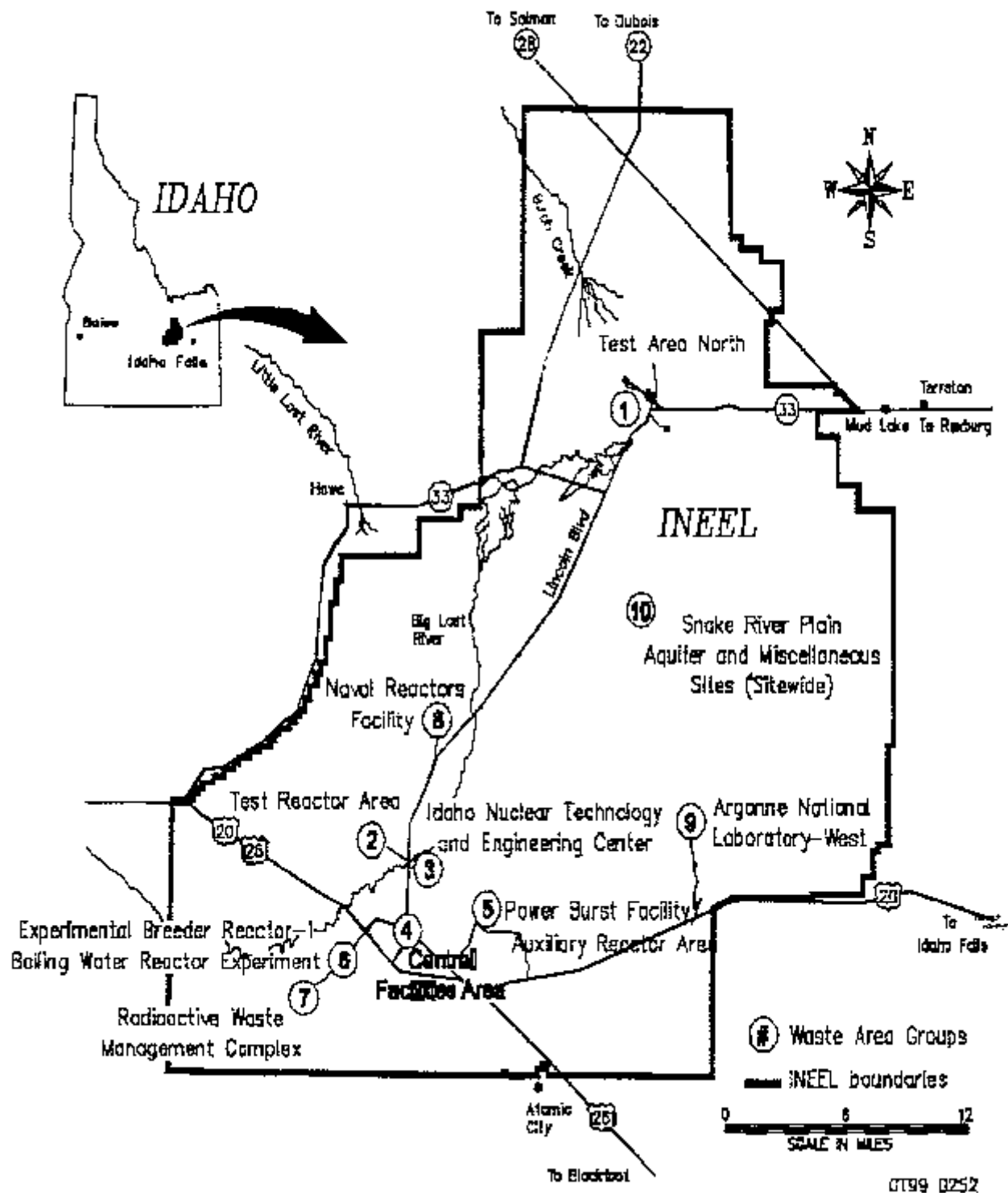


Figure 1-1. Location of WAG 4 at the INEEL.

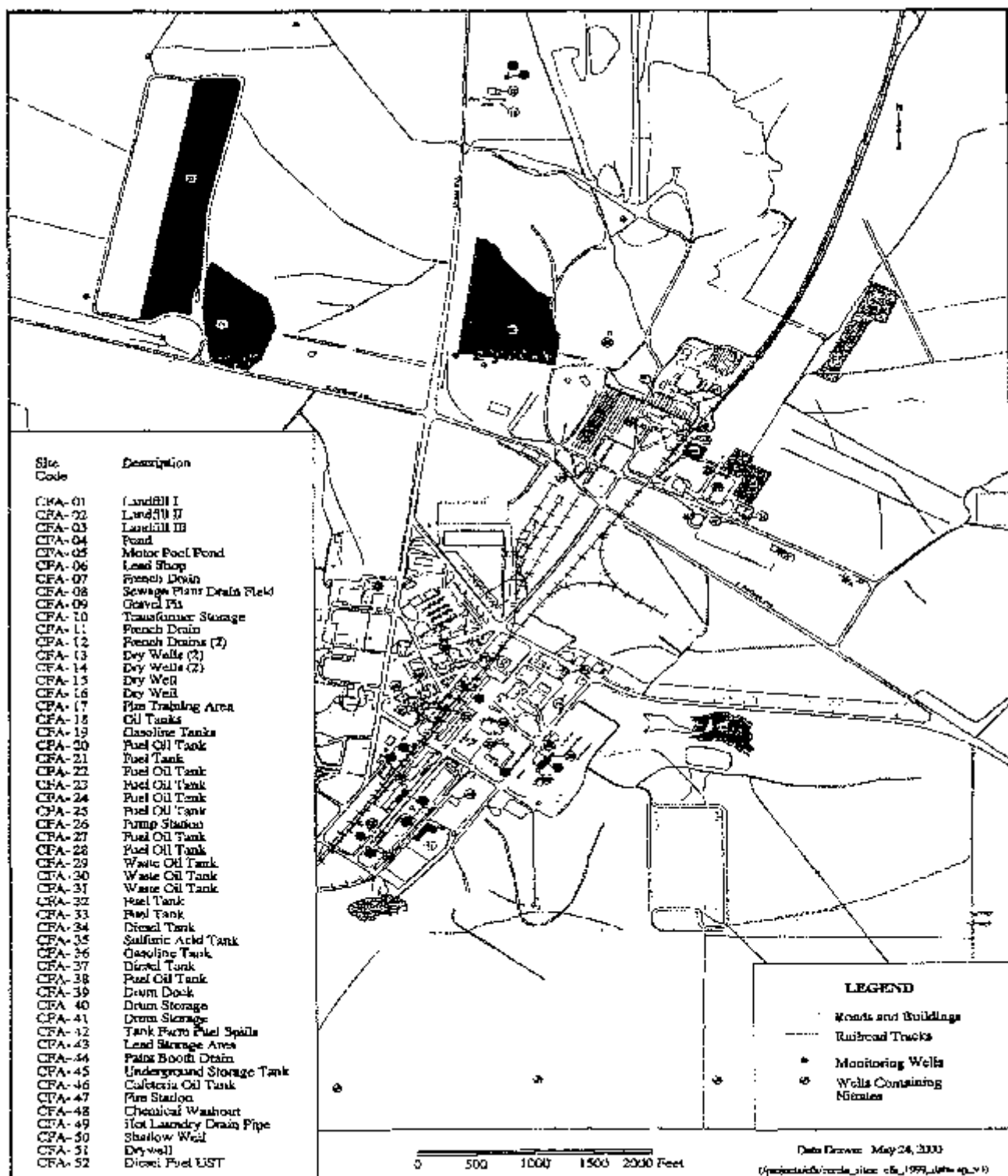


Figure 1-2. CERCLA sites and groundwater monitoring wells at WAG 4.

## **2. SITE HISTORY AND ENFORCEMENT ACTIVITIES**

### **2.1 INEEL History**

Parts of the current INEEL site were first used as gunnery and bombing ranges during World War II by the U.S. Navy and U.S. Army Air Corps. The site was established in 1949 as the National Reactor Testing Station by the U.S. Atomic Energy Commission and was historically devoted to energy research and related activities. The National Reactor Testing Station was renamed in 1974 to the Idaho National Engineering Laboratory (INEL) to reflect a broader scope of engineering activities. In 1997, the name was changed to INEEL to reflect a growing emphasis on environmental remediation and research. Historically, facilities at INEEL were dedicated to the development and testing of peaceful applications of nuclear power. Waste disposal practices from these operations resulted in contamination of some facilities and the surrounding environment.

Throughout the 50 years of INEEL operations, disposal practices have been implemented in compliance with state and federal regulations and policies established by DOE and its predecessors. Some of these practices are not acceptable by contemporary standards and have been discontinued. Contaminated structures and environmental media, such as soil and water, are the legacy of some historical disposals. Occasional accidental releases have also occurred over time. In keeping with the contemporary emphasis on environmental issues, INEEL research is now focused on environmental restoration to address these contaminated media and waste management issues to minimize additional contamination from current and future operations. Spent nuclear fuel management, hazardous and mixed waste management and minimization, cultural resources preservation, and environmental engineering, protection, and remediation are challenges addressed by current INEEL activities (DOE-ID 1996).

### **2.2 CFA History**

The original buildings at CFA, built in the 1940s and 1950s, housed Navy gunnery range personnel, administration, shops, and warehouse space. The facilities have been modified over the years to fit changing needs and now provide four major types of functional space: (1) craft (2) office, (3) service, and (4) laboratory. Approximately 1,028 people work at CFA. Public access to INEEL is strictly controlled through the use of security personnel and security measures such as fences around sensitive facilities.

### **2.3 WAG 4 Enforcement Activities**

In January 1984, hazardous waste disposal sites within the INEEL that could pose an unacceptable risk to human health and safety or the environment were identified (EG&G 1984). The sites were ranked using either the EPA hazard ranking system for sites with chemical contamination or the DOE modified hazard ranking system for sites with radiological contamination. Based on the results of the hazard ranking, DOE-ID) entered into a *Consent Order and Compliance Agreement with Region 10* (COCA 1987), which regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. A hazard ranking score of 28.5 or higher qualifies a site for the *National Priorities List* (54 FR 48184) as amended by CERCLA (42 USC 9601 et seq.). Because the Test Reactor Area (WAG 2) received a score in excess of 28.5, the entire reservation became a candidate for the National Priorities List.

On November 15, 1989, the EPA added INEEL to the National Priorities List under CERCLA (42 USC 9601 et seq.). An FFA/CO and Action Plan (DOE-ID 1991) were negotiated and signed by DOE-ID, EPA, and the IDHW in December 1991, to implement the rededication of the INEEL under

CERCLA. Effective December 9, 1991, the FFA/CO superseded the corrective action elements of the *Consent Order and Compliance Agreement* (COCA 1987).

The goals of the FFA/CO are two-fold: (1) ensure that potential or actual INEEL releases of contaminants to the environment are thoroughly investigated in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300), and (2) appropriate response actions are taken to protect human health and the environment. The FFA/CO established the procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the INEEL in accordance with CERCLA and RCRA legislation and the *Idaho Hazardous Waste Management Act* (Institutional control [IC] § 39-4401). The FFA/CO is consistent with a general approach approved by the EPA and DOE in which agreements with states as full partners would allow site investigation and cleanup to proceed using a single road map to minimize conflicting requirements and maximize limited rededication resources. For management purposes, the FFA/CO divided INEEL into 10 WAGs.

The Secretary of Energy's Policy Statement (DOE 1994) on the National Environmental Policy Act (42 USC 4321 et seq.) stipulates that DOE will rely on the CERCLA process for review of actions to be taken under CERCLA. The policy statement also requires that DOE address National Environmental Policy Act values and public involvement procedures by incorporating such values, to the extent practicable, in documents and public involvement activities generated under CERCLA.

The OU 4-13 comprehensive remedial investigation /feasibility study (RI/FS) is the final investigation for WAG 4 identified in the FFA/CO. Actions conducted under the authority of CERCLA are summarized below.

### **2.3.1 CERCLA Actions**

Two RODs, three time-critical removal actions, and four nontime-critical removal actions have been performed at WAG 4. The first ROD for WAG 4 was for the OU 4-11 Motor Pool Pond and was signed on December 31, 1992 (DOE-ID 1992a). ROD 4-11 resulted in no action with further evaluation of potential risk via the groundwater pathway in the OU 4-13 Comprehensive RI/FS (DOE-ID 1999a).

A second ROD was issued on October 10, 1995, for the OU 4-03 Underground Storage Tank sites and OU 4-12 Landfills I, II and III (DOE-ID 1995). This ROD resulted in 19 No Further Action determinations for the underground storage tanks and installation of compacted native soil covers over the three landfills as a presumptive remedy. The ROD also called for cover and groundwater monitoring along with institutional controls. Groundwater monitoring wells were installed in 1995 and 1996. The landfill covers and monitoring systems were emplaced in 1997. Groundwater monitoring at WAG 4 was carried out under the *OU 4-12 Post-ROD Monitoring Work Plan* (DOE-ID 1997a). The monitoring commenced in 1996 and will continue until 2026, unless a five-year review alters that decision. A monitoring report has been published that summarizes data from the first two years of monitoring (DOE-ID 2000a, draft).

Three time-critical removal actions were performed at WAG 4 for the CFA-04 Pond, CFA-06 and -43 Lead Sites, and CFA-42 Tank Farm Spills. Approximately 218 m<sup>3</sup> (285 yd<sup>3</sup>) of mercury-contaminated soil and calcine material were removed from the pond periphery and treated in an on-INEEL retort unit. Analytical data collected after the removal action indicated that mercury-contaminated soil remained in the pond bottom, a windblown area and along a pipeline that discharged to the pond. As a result the site was investigated further in the OU 4-13 RI/FS (DOE-ID 1999a).

A time-critical removal action was conducted in 1996 at CFA-06 Lead Shop and CFA-43 Lead Storage Area, which resulted in the excavation of approximately 457 m<sup>3</sup> (600 yd<sup>3</sup>) of lead- and arsenic-

contaminated soil. Soil was shipped to an off-INEEL disposal facility. No further action was required per confirmation sampling.(DOE-ID 1999a).

During time-critical removal actions in 1996 and 1997, approximately 6,718 m<sup>3</sup> (8,787 yd<sup>3</sup>) of petroleum-contaminated soil was removed from the CFA-42 Tank Farm Spills site. The tanks and associated pumping and piping systems were removed and soil was excavated to basalt. Potential risk remaining from the site was evaluated in the OU 4-13 RI/FS (DOE-ID 1999a).

Three nontime-critical removal actions were performed in 1997 at CFA-13, -15, -17 and -47. CFA-13 was a sewer clean out that received waste from Building CFA-640. The cleanout was excavated and disposed at the CFA Bulk Waste Landfarm. Potential risk from the soil surrounding the cleanout was evaluated in the OU 4-13 RI/FS (DOE-ID 1999a). The CFA-15 dry well was a concrete pipe 0.61 m (2 ft) in diameter by 2.44 m (8 ft) deep that received waste from Building CFA-674, i.e., discharged to the CFA-04 Pond. Potential risk from the soil surrounding the dry well was evaluated in the OU 4-13 RI/FS (DOE-ID 1999a).

One nontime-critical removal action was performed for sites CFA-17 and CFA-47, bermed fire pits and associated asphalt pad and an adjacent fire station chemical disposal area. A total of 4,051 m<sup>3</sup> (5,298 yd<sup>3</sup>) were removed from the two areas. Soil was excavated to basalt. Potential risk from the sites was evaluated in the OU 4-13 RI/FS (DOE-ID 1999a).

It should be noted that the FFA/CO identified sites CFA-09 and CFA-11 as sites for which Interim Actions were planned as part of the OU 10-05 Ordnance Sites Interim Action ROD. However, geophysical investigations revealed no evidence of ordnance material at CFA-09 or CFA-11 and they were designated as no action sites in the OU 10-05 Ordnance Sites Interim Action ROD (DOE-ID 1992b).

### 3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

In accordance with CERCLA §113(k)(2)(b)(i-v) and §17, a series of opportunities for public information and participation in the WAG 4 Comprehensive OU 4-13 RI/FS and decision-making process was provided to the public between June 1997 and October 1999. The opportunities to obtain information and provide input included a “kick-off” fact sheet, *INEEL Reporter* newsletter articles (a publication of the INEEL’s Environmental Restoration Program), three Citizen’s Guide supplemental updates, one “update” fact sheet, a proposed plan, briefings and presentations to interested groups, and public meetings.

In June 1997, a “kick-off” fact sheet concerning the WAG 4 Comprehensive OU 4-13 RI/FS was sent to about 600 individuals from the general public and INEEL employees on the *Community Relations Plan* mailing list. Included with the fact sheet was a postage-paid return mailer comment form. No comments were received. This fact sheet also offered technical briefings to those interested in the WAG 4 comprehensive remedial investigation. This was the initial opportunity for public input in the RI process. Initially, no technical briefings were requested, but briefings were provided later in the RI process.

Bimonthly issues of the *INEEL Reporter*, which provided status of the investigation, were regularly sent out to individuals on the mailing lists. Reports also appeared in three issues of a *Citizen’s Guide to Environmental Restoration at the INEEL* (a supplement to the *INEEL Reporter*) in early 1997, 1998, and late June 1999.

In May 1999, an “update” fact sheet was distributed to approximately 600 citizens on the INEEL Community Relations Plan mailing list. The purpose of the document was to keep citizens apprised of developments that occurred during the OU 4-13 RI/FS and to announce the approximate dates of future public meetings. The fact sheet offered technical briefings to those interested in the WAG 4 RI/FS.

The final WAG 4 Proposed Plan for remedial action at WAG 4 was mailed to about 600 members of the public on the *INEEL Community Relations Plan* mailing list during the week of July 26, 1999. The public comment period for the WAG 4 Proposed Plan began August 5 and was planned to end on September 4, 1999. However, at the request of the public, the comment period was extended 30 days to October 4, 1999.

During the week of August 2, 1999, personal calls were made to Idaho stakeholders in various Idaho communities. The purpose of the telephone calls was to inform individuals of upcoming public meetings and assess if a technical briefing was desired. As a result, technical briefings were held August 13, 1999, with Coalition 21. Coalition 21 is an organization of retired INEEL employees. The following week of August 16, 1999, another technical briefing was held with a member of an environmental group.

Also during the week of August 2, 1999, DOE-ID issued a news release to more than 100 media contacts concerning the beginning of a 30-day public comment period pertaining to the WAG 4 Proposed Plan. Many of the news releases resulted in short notes in community calendar sections of newspapers and in public service announcements on radio stations. The news release gave notice to the public that supportive WAG 4 investigation documentation was available in the Administrative Record (AR) section of the INEEL Information Repositories located in the INEEL Technical Library in Idaho Falls, Albertson Library on the campus of Boise State University, and the University of Idaho Library in Moscow, Idaho. During the week of August 2, 1999, display advertisements announcing the availability of the Proposed Plan and the locations of public meetings appeared in regional newspapers in Idaho Falls, Boise,

Moscow, Arco, Fort Hall, Pocatello, and Twin Falls, Idaho. Large display advertisements appeared in the following newspapers: (1) the *Post Register* (Idaho Falls); (2) the *Arco Advertiser* (Arco); (3) *The Sho-Ban News* (Fort Hall); (4) *The Idaho State Journal* (Pocatello); (5) *The Times-News* (Twin Falls); (6) the *Idaho Statesman* (Boise); and (7) the *Moscow-Pullman Daily News* (Moscow). A follow-up advertisement ran in newspapers approximately four days before the public meetings in Idaho Falls, Boise, and Moscow. Post cards were mailed to approximately 5,400 citizens on the INEEL mailing list informing them of the availability of the WAG 4 Proposed Plan, the duration of the comment period, and the times and locations of upcoming public meetings. An electronic note was sent to all INEEL employees providing this information.

DOE-ID gave two briefings on the WAG 4 Proposed Plan to the INEEL Citizen's Advisory Board (CAB) and its Environmental Restoration Program Subcommittee. The advisory board is a group of 15 individuals, representing the citizens of Idaho, who make recommendations to DOE, EPA, and the State of Idaho regarding environmental restoration activities at the INEEL. On September 21, 1999, members of the CAB toured the three CFA contaminated-soil sites proposed for remediation. On September 22, 1999, the INEEL CAB met to finalize and submit their formal recommendations on the proposed plan to DOE.

For the general public, participation in the decision-making process included receiving the Proposed Plan, attending availability sessions before public meetings to informally discuss issues, attending public meetings, and submitting verbal and written comments to the Agencies during the 30-day public comment period. Citizens were urged to comment on the proposed plan and to attend public meetings. Public meetings were held in Idaho Falls on August 17, Boise on August 18, and Moscow on August 19, 1999. Prior to public meetings in each location, an availability session took place from 6 to 7 p.m. Public meetings began at 7 p.m.

Approximately 30 people not associated with the WAG 4 project attended the public meetings. Written comment forms (including a postage-paid, business-reply form) were made available to those attending the public meetings. The forms were used to submit written comments either at the meeting or by mail. The reverse side of the meeting agenda contained a form for the public to use in evaluating the effectiveness of the meetings. A court reporter was present at each meeting to record transcripts of discussions and public comments. The meeting transcripts were placed in the AR section for the WAG 4, CFA, and OU 4-13 in three INEEL Information Repositories. For those who could not attend the public meetings, but wanted to make formal written comments, a postage-paid written comment form was attached to the WAG 4 Proposed Plan.

Overall, 13 groups or members of the public provided formal comments; five citizens provided verbal comments at the public meetings and eight provided written comments. All comments received on the WAG 4 Proposed Plan were considered during the development of this ROD. The decision, finalized in this ROD, is based on the information in the AR for OU 4-13.

Part III of this ROD, the Responsiveness Summary, includes responses to all formal verbal comments presented at the public meetings and all written comments received on the WAG 4 Proposed Plan. Transcripts of oral comments and scanned versions of written comments are provided in Appendix A in their entirety. The oral and written comments are also included in the AR for WAG 4.

## **4. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION**

OU 4-13 Comprehensive RI/FS is the culmination of all of the CERCLA evaluations performed for WAG 4 at CFA. Table 4-1 presents a summary of all the affected WAG 4 sites, their OU, and the decisions made per this OU 4-13 ROD. According to the FFA/CO, the boundary of WAG 4 encompasses the facility locations and all surface and subsurface areas presently or historically used within the CFA area, as well as adjacent areas where waste activities may have taken place. The issuance of the ROD for OU 4-13, marks the beginning of final remedial activities. As specified in the action plan attached to the FFA/CO (DOE-ID 1991), post-ROD activities will include remedial design/remedial action (RD/RA) phases. The RD/RA will commence with the development of a scope of work to identify and establish deadlines for submitting other documents and outline the overall strategy for managing the RD/RA. A draft scope of work will be submitted to EPA and IDHW for review within 21 days of the issuance of the ROD. Substantial continuous physical remedial action within WAG 4 will commence within 15 months of the issuance of the ROD.

No principal threats have been identified at WAG 4. A principal threat is defined by EPA as source material considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur (EPA 1999b).

### **4.1 Remedial Action Sites**

Remedial actions at WAG 4 protect human health and the environment. Three actions will be implemented to mitigate the unacceptable risks to human or ecological receptors associated with the three specific sites identified in the WAG 4 Comprehensive RI/FS (DOE-ID 1999a) and Proposed Plan (DOE-ID 1999b).

The first remedial action addresses the risk associated with mercury at the CFA-04 Pond. Mercury-contaminated soil in the pond bottom, the adjacent windblown area, and the pipeline will be excavated, treated as required, and disposed to the INEEL CERCLA Disposal Facility (ICDF). Treatment will include stabilization with cement of that portion of the soil with mercury concentrations in excess of the RCRA characteristic hazardous waste level.

The second action will be implemented to mitigate the risk posed by soil in the CFA-08 Sewage Plant Drainfield. Cesium-137 contaminated soil in the drainfield will be contained with an engineered barrier. Long-term monitoring and institutional controls will be implemented as part of the remedy.

The third action mitigates risk associated with lead-contaminated soil at the CFA-10 Transformer Yard site. Soil will be excavated, treated as required, and disposed of to an off-INEEL disposal facility. The decision to use an off-site facility is based on a comparative cost analysis of managing this relatively small volume of waste in the ICDF. Treatment will include stabilizing that portion of the soil with lead concentrations in excess of the RCRA characteristic hazardous waste levels using cement.

### **4.2 No Action and No Further Action Sites**

Per this ROD, a no action site is a site that has no contaminant source or has a minor contaminant source with an acceptable risk level under a current residential exposure scenario, i.e., the risk is less than  $1 \times 10^{-4}$  or the hazard quotient is less than 1. A no further action site is a site that is not available for unrestricted exposure and unlimited use. For WAG 4, there is one reason for a site to be a no further action site:

**Table 4-1.** Summary of WAG 4 Sites.

Operable Unit	Site Code	Site Name	No Further Action-Institutional Controls
4-01	CFA-09	Central Gravel Pit	No Action
	CFA-11	French Drain (containing a 5-in. shell north of CFA-663)	No Action
4-02	CFA-13	Dry Well (south of CFA-640)	No Action
	CFA-14	Two Dry Wells (CFA-665)	No Action
	CFA-15	Dry Well (CFA-674)	No Action
	CFA-16	Dry Well (south of CFA-682 pumphouse)	No Action
4-03	CFA-18	Fire Department Training Area, Oil Storage Tanks	No Action
	CFA-19	Gasoline Tanks (2) East of CFA-606	No Action
	CFA-20	Fuel Oil Tank at CFA-609 (CFA-732)	No Action
	CFA-21	Fuel Tank at Nevada Circle 1 (South by CFA-629)	No Action
	CFA-22	Fuel Oil at CFA-640	No Action
	CFA-23	Fuel Oil Tank at CFA-641	No Action
	CFA-24	Fuel Tank at Nevada Circle 2 (South by CFA-629)	No Action
	CFA-25	Fuel Oil Tank at CFA-656 (North Side)	No Action
	CFA-27	Fuel Oil Tank at CFA-669 (CFA-740)	No Action
	CFA-28	Fuel Oil Tank at CFA-674 (West)	No Action
	CFA-29	Waste Oil Tank at CFA-664	No Action
	CFA-30	Waste Oil Tank at CFA-665, active	No Action
	CFA-31	Waste Oil Tank at CFA-754, active	No Action
	CFA-32	Fuel Tank at CFA-667 (North Side)	No Action
	CFA-33	Fuel Tank at CFA-667 (South Side)	No Action
	CFA-34	Diesel Tank at CFA-674 (South)	No Action
	CFA-35	Sulfuric Acid Tank at CFA-674 (West Side)	No Action

**Table 4-1.** (continued).

Operable Unit	Site Code	Site Name	No Further Action-Institutional Controls
4-04	CFA-36	Gasoline Tank at CFA-680	No Action
	CFA-37	Diesel Tank at CFA-681 (South Side)	No Action
	CFA-38	Fuel Oil Tank, CFA-683	No Action
	CFA-45	Underground Storage Tank	No Action
	CFA-39	Drum Dock (CFA-771)	No Action
	CFA-40	Returnable Drum Storage-South of CFA-601	No Action
4-05	CFA-41	Excess Drum Storage-south of CFA-674	No Action
	CFA-04	Pond	Remedial Action
	CFA-17	Fire Department Training Area, bermed	No Action
	CFA-47	Fire Station Chemical Disposal	No Action
4-06	CFA-50	Shallow Well East of CFA-654	No Action
	CFA-06	Lead Shop (outside areas)	No Action
	CFA-43	Lead Storage Area	No Action
	CFA-44	Spray Paint Booth Drain	No Action
	CFA-07	French Drains E/S (CFA-663)	No Further Action-Institutional Controls
	CFA-12	French Drains (2) (CFA-690)	No Action
4-08	CFA-48	Chemical Washout South of CFA-663	No Action
		Sewage Plant	No Action
		Pipeline	No Action
	CFA-08	Sewage Plant Drainfield	Remedial Action
4-09	CFA-49	Hot Laundry Drain Pipe	No Action
	CFA-10	Transformer Yard	Remedial Action
	CFA-26	CFA-760 Pump Station Fuel Spill	No Action
	CFA-42	Tank Farm Pump Station Fuel Spills	No Action
	CFA-46	Cafeteria Oil Tank Spill (CFA-721)	No Action

**Table 4-1.** (continued).

Operable Unit	Site Code	Site Name	No Further Action-Institutional Controls
4-11	CFA-05	Motor Pool Pond	No Action
4-12	CFA-01	Landfill I	Addressed under the OU 4-12 ROD-continued operation, maintenance, and monitoring
	CFA-02	Landfill II	
	CFA-03	Landfill III	
4-13 <sup>a</sup>	CFA-51	Drywell at North End of CFA-640	No Action
	CFA-52	Diesel Fuel UST (CFA-730) at Bldg CFA-613 Bunkhouse	No Action
a) OU 4-13 was amended April 1996 to include these two sites.			

- It has a contaminant source at depths greater than 3 m (10 ft) below grade that might pose a risk to human health if it was ever brought to the surface. Contaminants do not have an exposure route (current residential exposure scenario) available under current site conditions.

The Agencies have determined that no action or no further action be taken under CERCLA at 46 sites in WAG 4 (one additional site, CFA-08, has two no action portions, and a remedial action portion). A summary of these determinations is included in Table 4-1. Fifteen of these sites plus on portion of the CFA-08 site were determined to be no action during the RI/baseline risk assessment (BRA) analysis for this ROD. One additional site, CFA-07 (OU 4-07), French Drain, was determined to be a no further action site and will have institutional controls until it is otherwise evaluated and documented in a CERCLA five-year review. Additional details on these sites can be found in the AR.

The other 30 no action sites were determined to be no action for one of the following reasons:

- The site was a declared a no action site by the signing of a previous WAG 4 ROD.
- A source did not exist at the site.
- Contamination at the site was determined to pose a risk less than 1E-06 or have a hazard quotient less than 1 through a Track 1 or Track 2 evaluation.

### 4.3 Groundwater

No unacceptable risk were predicted via the groundwater pathway from sites at WAG 4 during the OU 4-13 Comprehensive RI/FS (DOE-ID 1999a). Additionally, groundwater monitoring for all wells at WAG 4 will be carried out under the Post-ROD Monitoring Work Plan. Please see Figure 1–2 for the monitoring well locations. The OU 4-12 Post-ROD Monitoring Work Plan included a cost estimate for 30 years of groundwater monitoring at WAG 4; the wells have monitored for four years to date. Monitoring will continue until such time as the five-year reviews show, and the Agencies agree, that it is no longer necessary. A monitoring report was prepared for this two year of quarterly monitoring

from 1996 to 1998 that also shows no constituents in the groundwater at WAG 4 are above risk-based concentrations (DOE-ID 2000a).

During the preparation of the OU 4-12 monitoring report, two constituents — lead and nitrate—were identified at elevated concentrations. Although there is no federal MCL for lead, the EPA lead action level and the State of Idaho groundwater quality standard is 15 ug/L, unless site-specific situations are taken into account (IDAPA 16.01.11). Lead concentrations in one well, CFA-MON-A-003, have exceeded this standard. Lead concentrations were below the quality standard during the first two sampling rounds in 1996, began increasing to a peak concentration of 44.8 ug/L in mid-1997, and have been decreasing since that time. The most recent sampling event reported a lead concentration of 19 ug/L in April 1999. Zinc and iron concentrations followed a similar trend in CFA-MON-A-003, although no groundwater standards were exceeded. Because this is an isolated occurrence and no lead sources were identified at CFA that could pose a risk to groundwater, lead levels in CFA-MON-A-003 are thought to be a localized phenomenon and will continue to be monitored.

Nitrate concentrations of approximately 20 mg/L and 10 mg/L were identified in two wells, CFA-MON-A-002 and CFA-MON-A-003, respectively. Nitrate levels in CFA-MON-A-002 were initially measured at 21 mg/L in 1995 and have declined to 16 mg/L in the most recent sampling round in March 2000. Nitrate levels in CFA-MON-A-003 have been measured between 8.65 and 11 mg/L, with an average concentration of 10 mg/L. Although these concentrations are below the calculated risk-based concentration (58 mg/L), the concentration in CFA-MON-A-002 exceeds the MCL identified in the National Primary Drinking Water Regulations (40 CFA 141). The MCL is 10 mg/L if the water is available to sensitive populations, such as infants below 6 months of age (40 CFA 141.62); the higher allowable limit is 20 mg/L if the water is not available to infants below 6 months of age or other sensitive populations (40 CFA 141.11). One risk from nitrate is “blue baby” syndrome in which nitrate preferentially replaces hemoglobin in a baby’s bloodstream, causing the skin to turn blue.

The Agencies initially decided to perform a separate groundwater RI/FS to assess the occurrence of nitrate in CFA-MON-A-002; that investigation was to be called OU 4-13B and the OU 4-13 RI/FS was referred to as OU 4-13A. On that basis, the Proposed Plan was issued in August 1999 as the OU 4-13A Proposed Plan and it summarized only the three remedial actions described previously.

Subsequent to the issuance of the Proposed Plan, trend analysis of the nitrate concentrations in CFA-MON-A-002 was performed, isotopic analysis of groundwater samples was conducted, a likely source was identified, and limited groundwater modeling was conducted (DOE-ID 2000b). The source was identified as CFA-08 Sewage Treatment Plan grainfield, which has not been used since February 1995. Per this ROD, the CFA-08 grainfield will be capped in 2002, thereby reducing subsurface infiltration. Modeling showed the plume is now diminishing and regression analysis showed that nitrate concentrations at CFA-MON-A-002 would likely go below the MCL of 10 mg/L in approximately 10 to 15 years. Nitrate concentrations in CFA-MON-A-002 have been below 20 mg/L in the last four sampling rounds since the fall of 1997. Regression analysis of nitrate data collected over a four-year period also showed a statistically significant downward trend for nitrate in CFA-MON-A-002 (DOE-ED 2000b).

The ultimate goal and applicable or relevant and appropriate MCL requirement for nitrate is 10 mg/L, which is predicted be achieved within 15 years at CFA-MON-A-002. Because CFA-MON-A-002 is a monitoring well that is presently located on the INEEL which is under DOE institutional control, the Agencies agreed that the groundwater is currently protective under this land use scenario. On that basis, further investigation of nitrate is not required. Nitrate concentrations will be determined annually at CFA-MON-A-002, and CFA-MON-A-003 per the Post-ROD Monitoring Work Plan that addresses groundwater monitoring at WAG 4 (DOE-ED 1997a). The State of Idaho and EPA

will be notified of the concentrations annually as required by 40 CFA 141.11. Additionally, nitrate concentrations and trends will be evaluated during the five-year reviews planned for WAG 4. If deviations to the predicted trend are noted the approach described herein will be re-evaluated by the Agencies, which may require a ROD amendment for active rededication. After the nitrate concentration falls below the MCL of 10 mg/L, annual reporting to the State and EPA will cease but the wells will continue to be monitored as necessary based on five-year reviews.

As a result of this evaluation DOE requested and the Agencies concurred that the OU 4-13B investigation should be discontinued and that this ROD become the Comprehensive OU 4-13 ROD for WAG 4 (DOE-ID 2000c).

## 5. SITE CHARACTERISTICS

### 5.1 Physical Characteristics

The INEEL is located on the Eastern Snake River Plain, a large topographic depression extending from the Oregon border across Idaho to Yellowstone National Park and northwestern Wyoming. The surface of the INEEL, in general, is covered by basalt flows and intermittent, discontinuous pockets of sediment.

Surface hydrology includes water from three streams that flow intermittently onto INEEL and local runoff caused by precipitation and melting snow. No ponds and streams are within WAG 4 except very briefly in conjunction with spring runoff. The Big Lost River is the nearest surface water feature and is not influenced by activities at WAG 4.

The vadose zone is the unsaturated region extending from land surface down to the water table, and varies in thickness from approximately 61 m (200 ft) thick in the northern part of INEEL to more than 274 m (900 ft) in southern portions of the Site (Irving 1993). The vadose zone is a complex series of heterogeneous basalt flows with thin layers of interbedded sediments. The basalt flows consist of thick dense intervals as well as large void spaces resulting from rubble zones, lava tubes, undulatory basalt-flow surfaces, and fractures. Sediment interbeds in the vadose zone consist of sand, silt, and clay and are generally thin and discontinuous. The vadose zone is approximately 146 m (480 ft) thick beneath CFA.

The Snake River Plain Aquifer (SRPA) underlies most of INEEL. The aquifer, defined as the saturated region beneath the vadose zone, arcs approximately 325 km (200 mi) through the eastern Idaho subsurface and varies in width from approximately 80 to 112 km (50 to 70 mi). The total area is about 25,000 km<sup>2</sup> (9,600 mi<sup>2</sup>). The SRPA discharges approximately 8.8E+09 m<sup>3</sup> (7.1 million acre/ft) of water annually to springs and rivers (EG&G 1993). The aquifer contains thick sequences of numerous, relatively thin basalt flows extending to depths of 1,067 m (3,500 ft) below ground surface (bgs). The SRPA also contains sediment interbeds within the basalt flows that are typically discontinuous. The aquifer has an estimated capacity of 2.5E+12 m<sup>3</sup> (8.8E+13 ft<sup>3</sup>) of water (EG&G 1986).

The SRPA is recharged primarily by infiltration from precipitation and deep percolation of irrigation water. Regional groundwater flows to the south-southwest; however, the flow direction can be affected locally by recharge from rivers, surface water spreading areas, and heterogeneity in the aquifer. Locally at CFA, the groundwater flow direction is to the south. Estimates of flow velocities within the aquifer range from 1.5 to 6.1 m/day (5 to 20 ft/day) (EG&G 1993). Flow in the aquifer is primarily through fractures, through interflow zones in the basalt, and in the highly permeable rubble zones located at the top of basalt flows. The aquifer is considered heterogeneous and anisotropic (having properties that differ depending on the direction of measurement) because of the permeability variations within the aquifer that are caused by basalt irregularities, fractures, void spaces, rubble zones, and sediment interbeds. The heterogeneity of the basalt bedrock results in a high variability in transmissivity values (measures of the ability of the aquifer to transmit water). Transmissivity measurements in wells on the INEEL range from 1.0E-01 to 1.1E+06 m<sup>2</sup>/day (1.1E+00 to 1.2E+07 ft<sup>2</sup>/day) (INEEL 1995a). Concerns about groundwater contamination from INEEL operations have prompted an extensive monitoring system over all of INEEL (EG&G 1993).

## 5.2 Climate

Meteorological and climatological data for the INEEL and the surrounding region are collected and compiled from several meteorological stations and three stations that are located at INEEL operated by the National Oceanic and Atmospheric Administration field office in Idaho Falls, Idaho.

The region is classified as arid to semiarid (DOE-ID 1989) with an annual average precipitation of 22.1 cm (8.7 in.). The rates of precipitation are highest during the months of May and June and lowest during July. Normal winter snowfall occurs from November through April, though occasional snowstorms occur in May, June, and October. Snowfall at the INEEL ranges from about 17.3 cm (6.8 in.) per year to about 151.6 cm (59.7 in.) per year, and the annual average is 70.1 cm (27.6 in.) (DOE-ID 1989). The INEEL is subject to severe weather episodes throughout the year. Thunderstorms are observed mostly during spring and summer. An average of two to three thunderstorms occurs during each month from June through August (EG&G 1981). Thunderstorms are often accompanied by strong gusty winds that may produce local dust storms. Precipitation from thunderstorms at INEEL is generally light. Occasionally, however, rain resulting from a single thunderstorm on INEEL exceeds the average monthly total precipitation (EG&G 1984).

The average summer daytime maximum temperature is 28°C (83°F), while the average winter daytime maximum temperature is -0.6°C (31°F). Recorded temperature extremes at the INEEL vary from a low of -44°C (47°F) in January to a high of 38°C (101°F) in July (DOE-ID 1989). The relative humidity at INEEL ranges from a monthly average minimum of 18% during the summer months to a monthly average maximum of 55% during the winter. The relative humidity is directly related to diurnal temperature fluctuations. Relative humidity reaches a maximum just before sunrise (the time of lowest daily temperature) and a minimum in midafternoon (the time of maximum daily temperature) (DOE-ID 1989).

The INEEL is in the belt of prevailing westerly winds, which are channeled within the Eastern Snake River Plain to produce a west-southwest or southwest wind approximately 40% of the time. The average midspring windspeed recorded at a height of 6 m (20 ft) is 9.3 mph, while the average midwinter windspeed is 5.1 mph (EG&G 1993).

## 5.3 Flora and Fauna

Six broad vegetation categories representing nearly 20 distinct habitats have been identified on the INEEL: (1) juniper-woodland, (2) native grassland, (3) shrub-steppe off lava, (4) shrub-steppe on lava (5) modified, and (6) wetlands. Though small riparian and wetland regions exist along the Big Lost River and Birch Creek, nearly 90% of the site is covered by shrub-steppe vegetation. The most common varieties are big sagebrush, saltbush, rabbitbrush, and native grasses.

The INEEL serves as a wildlife refuge because a large percentage of the Site is undeveloped and human access is restricted. Grazing and hunting are prohibited in the central part of the site. Mostly undeveloped, this tract may be the largest relatively undisturbed sagebrush steppe in the Intermountain West outside of the national parklands (DOE-ID 1996). More than 270 vertebrate species including 43 mammalian, 210 avian, 11 reptilian, nine fish, and two amphibious species have been observed on the site. Hundreds of birds of prey and thousands of pronghorn antelope and sage grouse have often wintered on INEEL. Mule deer and elk also reside at the Site. Observed predators include: bobcats, mountain lions, badgers, and coyotes. Bald eagles, classified as a threatened species, are commonly observed on or near the site each winter. Peregrine falcons, which are classified as endangered, have also been observed. In addition, other species that are candidates for listing as threatened or endangered by the U.S. Fish and

Wildlife Service may either inhabit or migrate through the area. Candidate species that may frequent the area include ferruginous hawks, pygmy rabbits, Townsend's big-eared bats, burrowing owls, and loggerhead shrikes.

The flora and fauna existing around CFA are representative of those found across the INEEL (Arthur et al. 1984; Reynolds et al. 1986). Wildlife species present in and around the CFA include birds, mammals, and reptiles that are associated with facilities, sagebrush-rabbitbrush, grasslands, and disturbed habitats, deciduous trees and shrubs, and water (e.g., facility ponds and drainage areas). Both aquatic and terrestrial species are potentially present. Sagebrush habitats in areas adjacent to facilities support a number of species including sage grouse and pronghorn antelope (game species) and areas of grassland provide habitat for species such as the western meadowlark (*Sturnella neglecta*) and mule deer (*Odocoileus hemionus*), also a game species. Buildings, lawns, ornamental vegetation, and disposal/drainage ponds at WAG 4 are also used by a number of species such as waterfowl, raptors, rabbits, mule deer, and bats. No areas of critical habitat as defined in the 40 CFR Part 300 are known to exist in or around CFA.

## 5.4 Demography

The human populations potentially affected by INEEL activities include INEEL employees, ranchers who graze livestock in areas on or near the INEEL, hunters on or near the site, residential populations in neighboring communities, and highway travelers.

Nine separate facilities at INEEL, Figure 1-1, include approximately 450 buildings and more than 2,000 other support facilities. Presently, the INEEL employs 8,348 contractor and government personnel. Employee totals at INEEL locations include 250 at the Waste Management Facility; 1,049 at the CFA; 433 at Test Area North; 511 at the Test Reactor Area; 622 at the Naval Reactors Facility; 1,201 at the Idaho Nuclear Technology and Engineering Center; 732 at Argonne National Laboratory–West; and 193 within the remaining site-wide areas, which include the Auxiliary Reactor Area. Approximately 3,231 INEEL employees occupy numerous offices, research laboratories, and support facilities in Idaho Falls.

The INEEL is bordered by five counties: (1) Bingham, (2) Bonneville, (3) Butte, (4) Clark, and (5) Jefferson (see Figure 5-1). The nearest communities to INEEL are Atomic City, located south of the INEEL border on U.S. Highway 26; Arco, 11 km (7 mi) west of INEEL; Howe, west of INEEL on U.S. Highway 22/33; and Mud Lake and Terreton on the northeast border of INEEL. Other communities located near the INEEL include Blackfoot and Shelley in Bingham County; Idaho Falls and Ammon in Bonneville County; Arco in Butte County; and Rigby in Jefferson County.

## 5.5 Cultural Resources

Over the past two decades, detailed inventories of cultural resources at some parts of the INEEL have been assembled. Initial surveys have been focused on areas within and around major operating facilities at the Site. Proposed future construction areas also have been examined. As of January 1, 1998, approximately 6.6% (37,681 acres) of the 2,305 km<sup>2</sup> (890 mi<sup>2</sup>) comprising the INEEL has been systematically surveyed for archaeological resources and 1,839 archaeological localities have been identified. The inventory includes prehistoric resources representing a span of approximately 12,000 years, as well as historic resources representing the last 150 years. Cultural resources on INEEL also include a number of more recent buildings, structures, and objects that have made significant contributions to the broad patterns of American history through the Site's association with World War II,

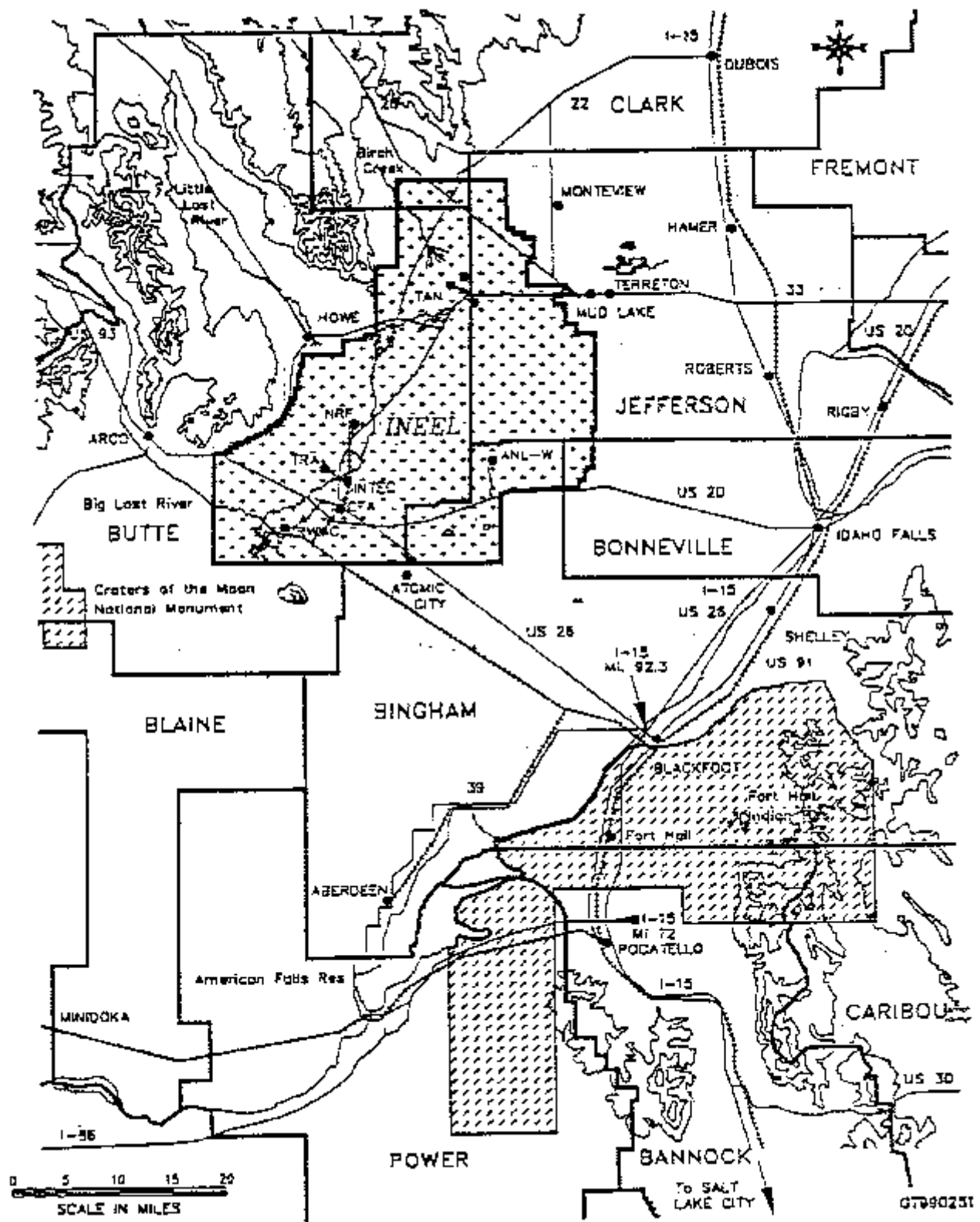


Figure 5-1. Counties surrounding the INEEL.

the Cold War, and important advances in nuclear science and technology. One INEEL facility, Experimental Breeder Reactor I, is recognized as a national historic landmark.

Local Native American people, particularly the Shoshone-Bannock tribal members of Fort Hall, Idaho, view all of the prehistoric sites on the INEEL as ancestral and of traditional cultural significance. A variety of natural features are also important to Native Americans. Native American burial sites, though rare, are of special concern on INEEL.

## **5.6 Conceptual Site Models**

The conceptual site models used in the OU 4-13 Comprehensive RI/FS to evaluate potential risk from surface soil, underground storage tanks and buried waste, and liquid discharge are shown in Figures 5-2 through 5-4. The models illustrate hypothetical exposure routes to current and future workers, future residents, and ecological receptors. Future occupational and residential scenarios are assumed to begin in 100 years. The models are based on land-use assumptions and the exposure assessment conducted for the OU 4-13 RI/FS. The human health conceptual site models (Figures 5-2 through 5-4) are based on the following land use assumptions:

- The INEEL will remain under government ownership and institutional control for at least the next 100 years (i.e., until the year 2095, 100 years from the date the INEEL land-use projections were established [DOE-ID 1996]).
- No residential development will occur within the INEEL boundaries within the institutional control period.

The complete conceptual site model for the ecological risk assessment (Figure 5-5) reflects the locations of contaminated media to which ecological receptors may be exposed. For a more detailed conceptual site model, see Section 7 of the OU 4-13 Comprehensive RI/FS (DOE-ID 1999a).

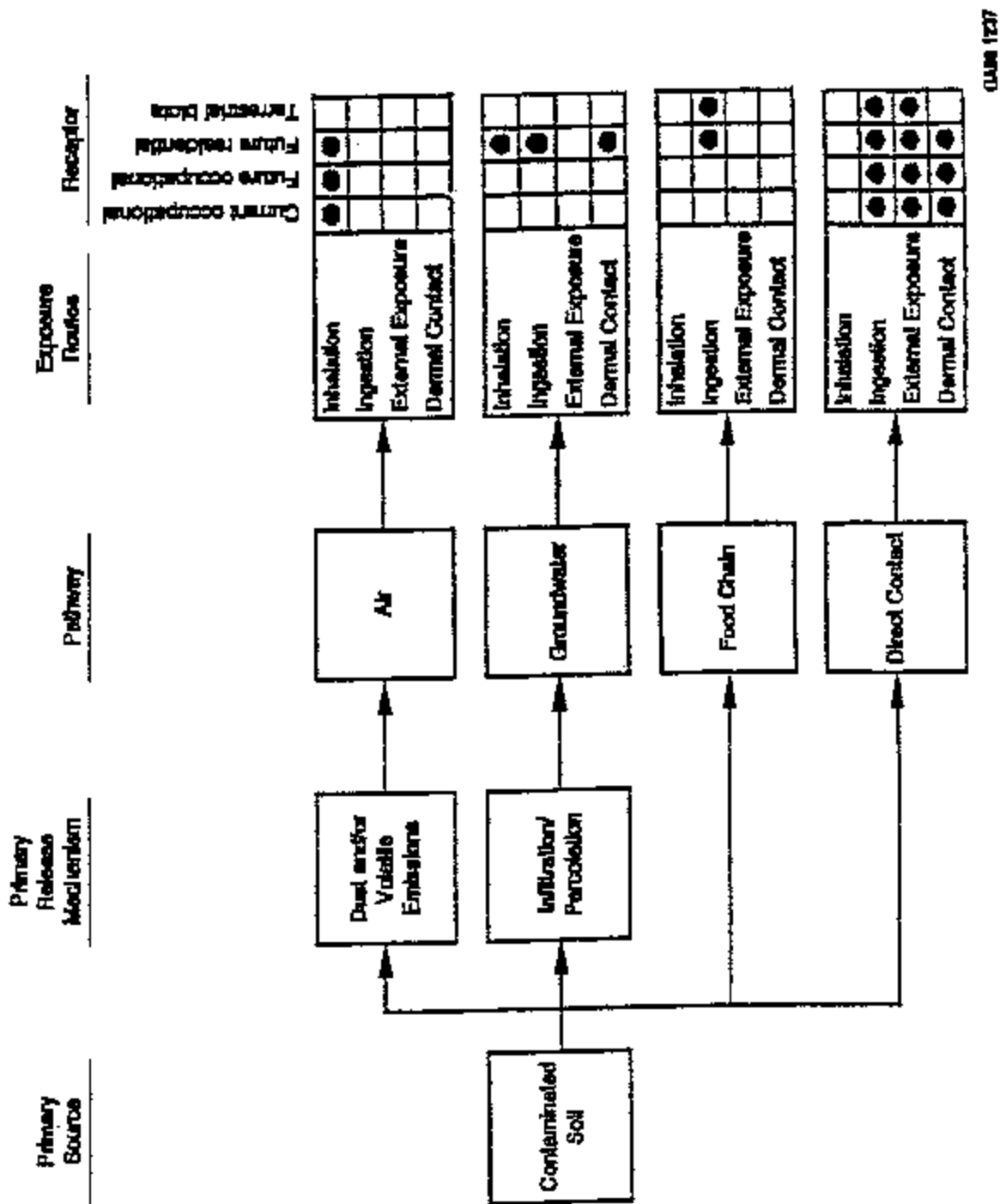


Figure 5-2. Conceptual site model for contaminated soil sites at CFA.

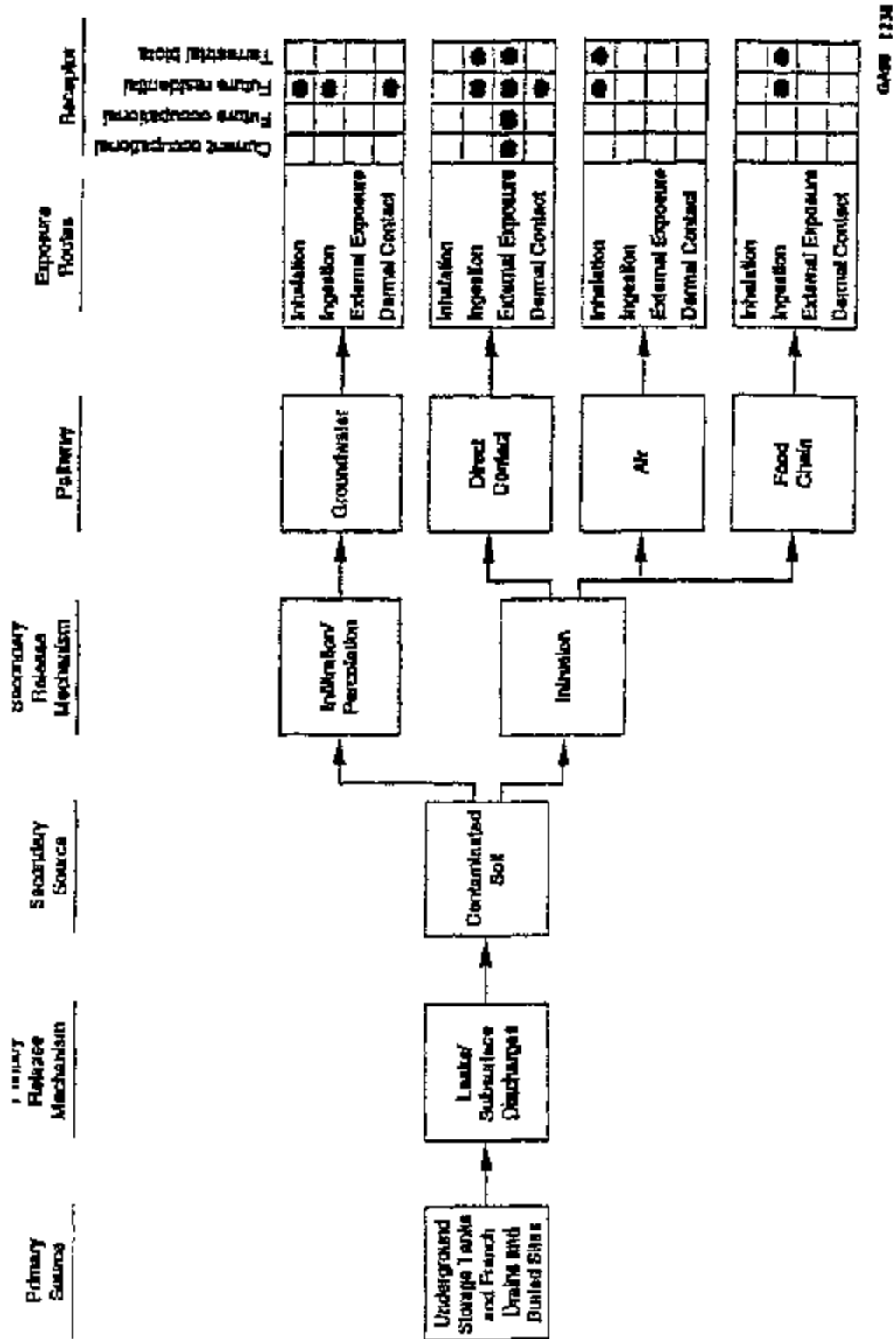


Figure 5-3. Conceptual site model for underground storage tanks and buried waste sites at CFA.



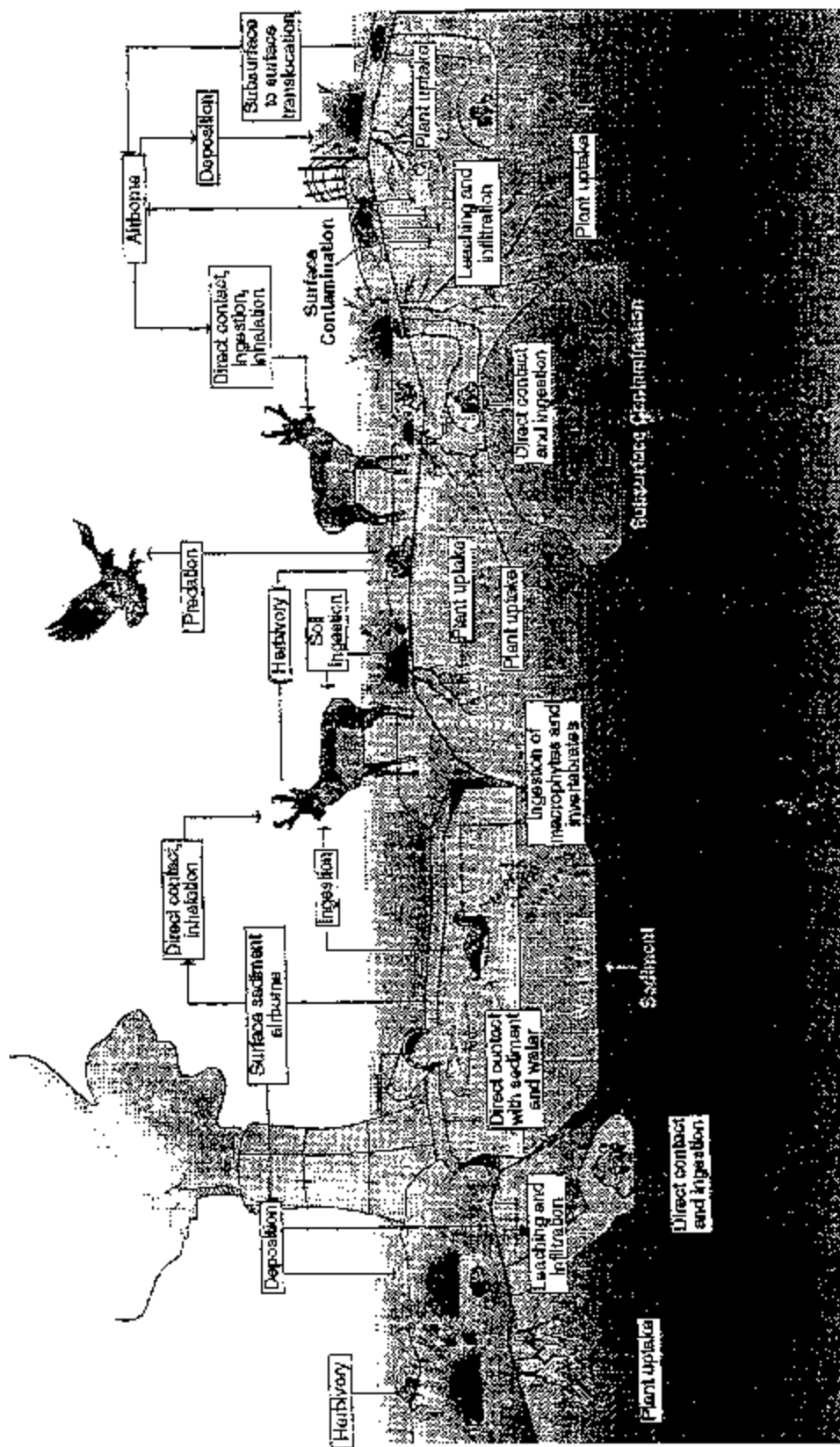


Figure 5-5. Complete conceptual site model for ecological receptors at WAG 4.

## 6. CURRENT AND POTENTIAL SITE AND RESOURCE USES

The INEEL has an area of approximately 2,305 km<sup>2</sup> (890 mi<sup>2</sup>) or (230,266 ha / 569,000 acres<sub>u</sub>). Approximately 98% of this land, has not been impacted by INEEL operations. The land use at the INEEL was evaluated in the Comprehensive Facility and Land Use Plan (CFLUP) (DOE-ID 1996). Land use on the entire INEEL is restricted. Though public highways traverse the INEEL, public access beyond the highway right-of-way is not allowed. Access to facilities requires proper clearance, training, or escort. There are specific controls in place to limit exposure to sites. Current and projected land use as described in the report is summarized below.

### 6.1 Current Land Use

The land within INEEL is classified as industrial or mixed use by the U. S. Bureau of Land Management (BLM) (DOE-ID 1996). The INEEL land use consists of wildlife management, government industrial operations, and waste management. As shown in Figure 6-1, large tracts of land are reserved as buffer and safety zones around the boundary of the INEEL. Operations are generally restricted to the INEEL proper. Aside from the operational facilities, the land within INEEL proper is largely undeveloped and used for environmental research, ecological preservation, and sociocultural preservation. No residential areas are located within the INEEL boundaries.

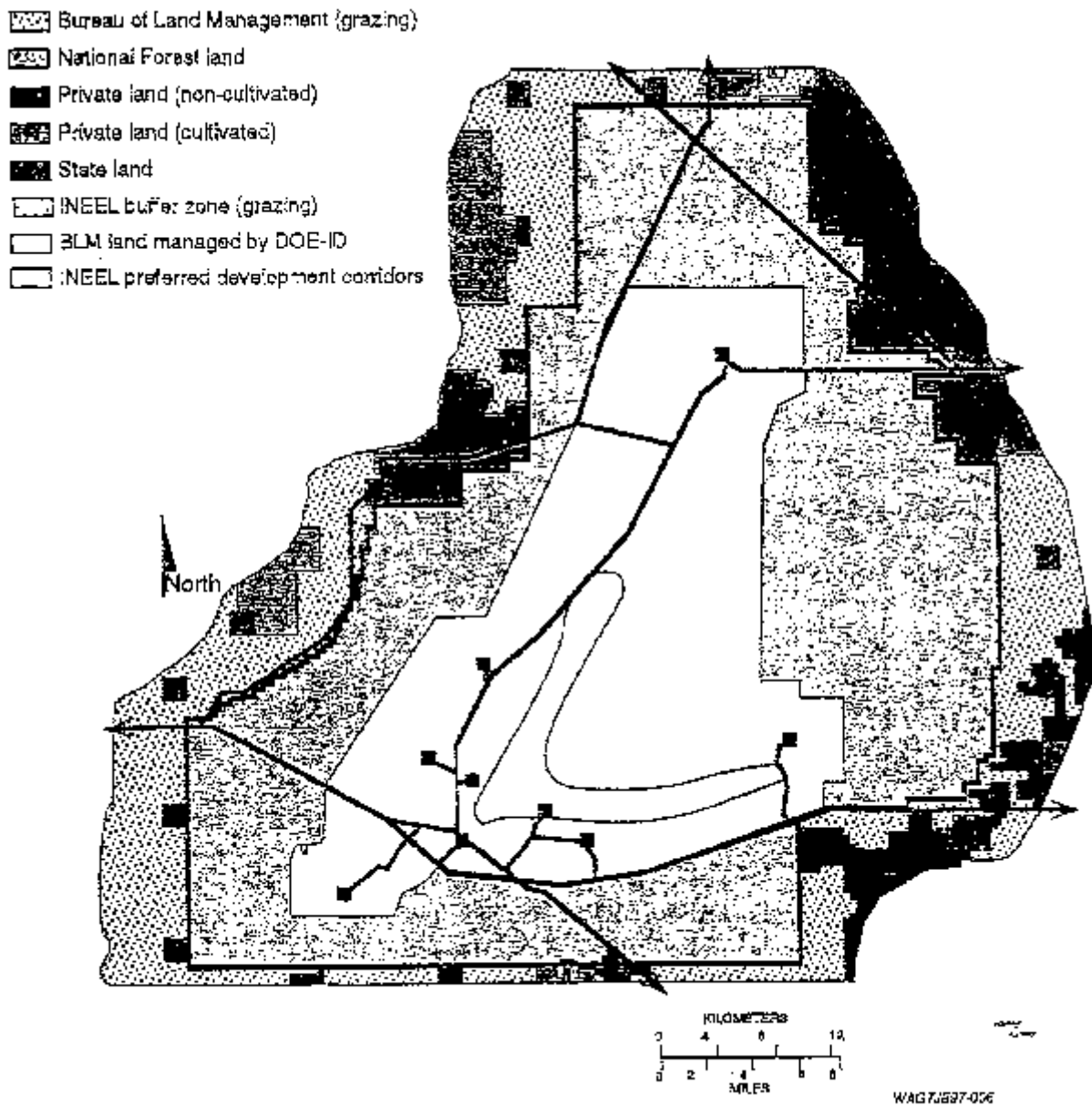
The buffer surrounding INEEL consists of 1,295 km<sup>2</sup> (500 mi<sup>2</sup>) of grazing land (DOE-ID 1996) administered by the BLM. Grazing areas around the INEEL support cattle and sheep, especially during dry conditions. Controlled hunts of game animals managed by the Idaho Department of Fish and Game are permitted on INEEL and within the buffer zone during selected years (DOE-ID 1996). Hunters are allowed access to an area that extends 0.8 km<sup>2</sup> (0.5 mi) inside INEEL boundary on portions of the northeastern and western borders of INEEL (DOE-ID 1996).

State Highways 22, 28, and 33 cross the northeastern portion of the Site. U.S. Highways 20 and 26 cross the southern portion (Figure 1-1). As much as 145 km (90 mi) of paved highways used by the general public and 23 km (14 mi) of Union Pacific Railroad tracks traverse the southern portion of the Site (DOE-ID 1996). A government-owned railroad passes from the Union Pacific Railroad at the CFA to the Naval Reactors Facility. An additional spur runs from the Union Pacific Railroad to the Radioactive Waste Management Complex.

In the counties surrounding the INEEL, approximately 45% of the land is used for agriculture, 45% is open land, and 10% is urban (DOE-ID 1996). Land use includes grazing, livestock production, and dairy farming (EG&G 1984). Major crops produced on land surrounding INEEL are wheat, alfalfa, barley, potatoes, oats, and corn. Sugar beets are grown within 64 km (40 mi) of INEEL in the vicinity of Rockford, Idaho. The land surrounding the INEEL is owned by either private individuals or the U.S. Government. The BLM administers the government land on INEEL (DOE-ID 1996).

### 6.2 Future Land Use

The future land use within the INEEL is projected to remain essentially the same as the current use: research facilities within the INEEL boundaries, agriculture, and open land surrounding the INEEL (Figure 6-1). The CFLUP was developed using a stakeholder process that involved a public participation forum, a public comment period, and the INEEL CAB. The public participation forum included members from local counties and cities, Shoshone-Bannock Tribes, BLM, DOE, U.S. Forest Service, U.S. National Park Service, Idaho Department of Transportation, Idaho Fish and Game, and eight businesses, education,



**Figure 6-1.** Land ownership distribution in the vicinity of the INEEL and on-INEEL areas open for permitted grazing.

and citizen organizations. EPA and IDHW participated in an ex officio capacity. Following review and comment by the public participation forum, the CFLUP underwent a 30-day public comment period and was subsequently submitted to the INEEL CAB for review and recommendations. No recommendations for residential use of any portions of the INEEL within the next 100 years have been received to date.

Land use projections are based on the following assumptions and factors:

- The INEEL will remain under government management and institutional control for at least the next 100 years
- DOE projections for the future of its national laboratory research and development activities and nuclear reactor programs
- The presence of active industrial and research facilities
- The presence of an industrial infrastructure
- The likely inability to “green field” (e.g., return to natural state with unrestricted land-use) the industrial complex without total removal of waste
- No nonindustrial land use within the INEEL, other than grazing
- Recommendations from the INEEL CAB and other stakeholders about future use assumptions.

Land use on the INEEL is anticipated to include unrestricted industrial uses, government-controlled industrial uses, unrestricted areas, controlled areas for wildlife management and conservation, and waste management areas. No residential development will be allowed within the INEEL boundaries, and no new major private developments (residential or nonresidential) on public lands are expected in areas adjacent to the Site. Grazing will be allowed to continue in the buffer area (DOE-ID 1996).

Regardless of the future use of the land now occupied by the INEEL, the federal government has an obligation to provide adequate institutional controls (i.e., limited access) to areas that pose significant health or safety risks until those risks diminish to acceptable levels (see Section 12.2). Fulfillment of this obligation is contingent on the continued viability of the federal government and on congress appropriating sufficient funds to maintain the institutional controls for as long as necessary.

### **6.3 Groundwater Use**

Current use of SRPA groundwater at CFA is for drinking and irrigation. Groundwater is extracted from two production wells at CFA (CFA-1 and CFA-2). A drinking water program was initiated in 1988 to monitor drinking water wells on the INEEL for compliance with drinking water system standards as established by EPA, the State of Idaho, and applicable DOE orders.

### **6.4 Groundwater Classification and Basis**

The eastern portion of the aquifer was granted sole source status by the EPA on October 7, 1991 (56 FR 50634). The definition of a sole source aquifer is that more than 50% of the people who live above the water use it for beneficial use. Idaho water quality standards are dictated primarily by the

recently promulgated Idaho Groundwater Quality Rule and the Idaho Water Quality Standards and Wastewater Treatment Requirements. The National Primary Drinking Water Regulations can also apply (IDAPA 16.01)

Three categories of protectiveness apply to the aquifer and its associated resources under Idaho regulations: (1) Sensitive Resources; (2) General Resources; and (3) Other Resources. Because no previous action to categorize the SRPA under Idaho regulations has occurred, the aquifer defaults to the “General Resources” category. General Resource aquifers are protected to ensure that groundwater quality is not jeopardized. Idaho’s groundwater standards incorporate federal radiation exposure and drinking water standards (10 CFR 20, 1999, Appendix B, Table 2; 40 CFR 141, 1998; and 143, 1998).

## 7. BASELINE RISK ASSESSMENT METHODOLOGY

The Baseline Risk Assessment (BRA) developed for WAG 4 (DOE-ID 1999a) evaluated the risk potential associated with contaminated media at CFA. The evaluation simulated a No Action alternative, meaning that mitigative measures to reduce risk were not considered. Methodologies implemented to evaluate the baseline human health and ecological risks are outlined below, followed by a summary of the results. Three sites were found to pose unacceptable risk to human health and the environment. For those three sites, components of the risks assessment specific to the selected remedies, such as contaminants of concern, contaminant concentrations, and risk estimates, are presented in detail in Section 8.

### 7.1 Human Health Risk Evaluation Summary

The human health risk assessment approach used in the BRA was based on the EPA *Risk Assessment Guidance for Superfund* (EPA 1989, 1992a), INEEL Track 2 Guidance (DOE-ID 1994), and the INEEL cumulative risk assessment guidance protocol (INEEL 1995b). The tasks associated with development of the human health risk assessment included the following:

- Data evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization
- Qualitative uncertainty analysis.

These tasks are described in the subsections below.

#### 7.1.1 Data Evaluation

Data evaluation tasks that were completed as part of the BRA included site screening, contaminant screening, and development of data sets for use in the-risk assessment. The screening processes were designed to be conservative so that only sites and contaminants that clearly do not pose an unacceptable risk to human health and the environment are eliminated.

Initial site screening consisted of a review of previous risk assessments conducted for WAG 4 sites identified in the FFA/CO. As a result of the site screening, 19 of the individual sites, including the sites identified in the FFA/CO, were retained for quantitative risk assessment in the comprehensive BRA. The remaining sites either exhibited no risk potential (e.g., the site had no source of contamination) or a risk potential sufficiently below threshold values to preclude a significant contribution to cumulative risk. Individual sites with risk estimates greater than or equal to  $1\text{E-}06$  or hazard indices greater than or equal to 1 were retained.

Site screening also involved a CFA Facilities Analysis that evaluated all operating, abandoned and demolished non-CERCLA facilities proximal or co-located to WAG 4 CERCLA sites. The analysis assessed their potential impacts to cumulative risk estimates to ensure that all historical releases were identified and assessed. The analysis included a review of past and present operational activities at CFA, existing facilities and structures, and management control procedures for mitigating the effects of future

environmental releases of contaminants. No facilities or structures were identified in the facilities analysis that would affect the cumulative risk calculations at WAG 4.

Contaminant screening consisted of comparing maximum detected concentrations to INEEL background concentrations (INEEL 1996a) and EPA risk-based concentrations (RBCs) (EPA 1995, 1997a). The Risk Based Concentrations (RBC) used to screen contaminants were calculated using the soil ingestion, soil inhalation, and external exposure pathways for a calculated lifetime cancer risk of 1E-06 or a Hazard Quotient (HQ) of 1. The most restrictive RBC was compared to the maximum detected soil concentration of each contaminant of concern. The most contaminants that exceeded the screening criteria were identified as contaminants of potential concern and retained for quantitative analysis in the BRA. Potential exposure routes were also identified in conjunction with contaminant screening using the conceptual site models (Section 5.6).

All sampling data collected at WAG 4 sites were evaluated to determine whether the data were appropriate and adequate for use in the BRA. This evaluation was conducted generally in accordance with EPA guidance (EPA 1992a). As a result of the screening process, 19 of the individual sites including the sites identified in the FFA/CO, were retained for quantitative risk assessment in the BRA.

### **7.1.2 Exposure Assessment**

The exposure assessment quantifies the receptor intake of contaminants of potential concern for those exposure pathways that may cause adverse effects. The assessment consists of estimating the magnitude, frequency, duration, and exposure route of contaminants to receptors. The following parameters are considered in estimating exposure assessment:

- Exposed populations
- Complete exposure pathways
- Contaminant concentrations at the points of exposure for the complete exposure pathways
- Intake rates
- Intake factors.

Both populations and exposure pathways evaluated in the WAG 4 comprehensive human health BRA are illustrated in the conceptual site models (Figure 5-2 through 5-4). Land-use assumptions and projections discussed in Section 6 were used to identify exposure scenarios, pathways, and routes.

- Exposure scenarios
  - G Occupational
  - G Residential intrusion
- Exposure pathways
  - G Groundwater pathway (cumulative)
  - G Air pathway (cumulative)
  - G Soil pathway

- Exposure routes
  - ! Soil ingestion
  - ! Inhalation of fugitive dust
  - ! Inhalation of volatiles
  - ! External radiation exposure
  - ! Dermal absorption from soil (organics and arsenic only)
  - ! Groundwater ingestion (residential scenario only)
  - ! Ingestion of homegrown produce (residential scenario only)
  - ! Dermal absorption of contaminants in groundwater (residential scenario only)
  - ! Inhalation of volatiles from indoor use of groundwater (residential scenario only).

Contaminant concentrations at the points of exposure for complete exposure pathways were calculated using upper confidence limits (UCLs) derived from analytical data. If sufficient data were not available for calculating UCL concentrations, the maximum detected concentration was used. For radioactive contaminants, radioactive decay was incorporated into the intake calculations. No degradation mechanisms for reducing the concentrations of organic or inorganic contaminants over time were considered.

Groundwater fate and transport modeling was used to predict the maximum contaminant concentrations that could occur in the aquifer from leaching and transport of nonradionuclide and radionuclide contaminants at WAG 4. The GWSCREEN model was used to simulate the potential release of contaminants from the release sites and the transport of the contaminants through the vadose zone to the aquifer.

To calculate intake rates, default intake factors from the EPA guidance (EPA 1989, 1991, and 1992a) and Track 2 guidance for the INEEL (DOE-ID 1994) were used. In conjunction with conversion factors and site-specific contaminant concentrations, these values were used to calculate contaminant intakes. The specific exposure parameters used for each receptor and exposure pathway are given in the OU 4-13 RI/FS (DOE-ID 1999a). Generally, occupational scenarios reflect workers exposed to contaminants for 8 hours/day, 250 days/year for 25 years and residential scenarios reflect exposures to contaminants for 24 hours/day, 350 days/year, for 30 years. Standard values were used to simulate the human body (e.g., mass, skin area, inhalation rates, and soil ingestion rates).

To satisfy the objective of the comprehensive risk assessment, risks produced through the air and groundwater exposure pathways were analyzed cumulatively. Cumulative risks were estimated by calculating one risk number for each contaminant of potential concern (COPC) in air and groundwater exposure routes (e.g., inhalation of fugitive dust and ingestion of groundwater) for each collection of sites in close proximity to one another. Analyzing risks for the air and groundwater pathways in a cumulative manner was necessary because contamination from all sites within an area can contribute to local air and groundwater contaminant concentrations. Conversely, individual sites within a WAG are typically isolated from one another relative to the soil pathway exposure routes (e.g., external exposure and

ingestion of soil). As a result, site-specific soil pathway exposures were analyzed. However, the BRA is comprehensive because it evaluates risks from all known sites within WAG 4, and it is cumulative because risks from multiple sites are evaluated in the air and groundwater exposure pathways.

### 7.1.3 Toxicity Assessment

The toxicity assessment evaluated the relationship between intake of a substance and incidence of an adverse health effect in the exposed population. Toxicity assessments evaluate the results from studies with laboratory animals or from human epidemiological studies. These evaluations were used to extrapolate from high levels of exposure, for which adverse effects are known to occur, to low levels of environmental exposures, for which effects could be postulated. Results of these extrapolations were used to establish quantitative indicators of toxicity.

Health risks from all routes of exposure were characterized by combining the chemical intake information with numerical indicators of toxicity (i.e., slope factors for carcinogens and reference doses for noncarcinogens). Toxicity constants used in the BRA were obtained from several sources. The primary source of information is the EPA online Integrated Risk Information System (IRIS) (EPA 1997b). The IRIS database contains only those toxicity constants that have been verified by EPA work groups. The IRIS database is updated monthly and supersedes all other sources of toxicity information. If the necessary data are not available in IRIS, EPA Health Effects Assessment Summary Tables (EPA 1994a) are used. The toxicity constant tables are published annually and updated approximately twice per year. The Health Effects Assessment Summary Tables contain a comprehensive listing of provisional risk assessment information that has been reviewed and accepted by individual EPA program offices, but has not had enough review to be recognized as high-quality, agency-wide information (EPA 1994a). Toxicity profiles for the contaminant of concern (COC) addressed in the selected remedies to mitigate unacceptable risk are presented below.

**7.1.3.1 Lead.** Lead is classified as a metal. No critical effects due to exposures to lead have been reported. However, many organs and systems are adversely affected by lead exposure. The major target organs and systems are the central nervous system, the peripheral nerves, the kidney, the gastrointestinal system, and the blood system (Sittig 1985). Anemia can be an early manifestation of lead poisoning. Other early effects of lead poisoning can include decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, digestive symptoms, abdominal pains, and decreased appetite. The major central nervous system effects can include dullness, irritability, headaches, muscular tremors, inability to coordinate voluntary muscles, and loss of memory. The most sensitive effect for adults in the general population may be hypertension (Amdur, Doull, and Klaassen 1991).

Ingestion and inhalation of lead have the same effects on the human body. Large amounts of lead can result in severe convulsions, coma, delirium, and possibly death. A high incidence of residual damage, similar to that following infections or traumatic damage or injury, has been observed from sustained exposure to lead. Most of the body burden of lead can be in the bone (ATSDR 1990). Lead effects in the peripheral nervous system are primarily manifested by weakness of the exterior muscles and sensory disturbances. Lead also has been shown to adversely affect sperm and damage other parts of the male reproductive system (ATSDR 1990). Dermal absorption of inorganic lead compounds was reported to be much less significant than absorption by inhalation or oral routes of exposure (ATSDR 1990).

Behavioral effects of lead exposure are a major concern, particularly in children. Exposure to lead can cause damage to the central nervous system, mental retardation, and hearing impairment in children. Levels of exposure that may have little or no effect on adults can produce important biochemical alterations in growing children that may be expressed as altered neuropsychological behavior (Martin 1991).

Though the ability of lead to cause cancer in humans has not been shown, EPA has classified lead as a probable human carcinogen through both the ingestion and inhalation routes of exposure. Lead classification was based on the available evidence of cancer from animal studies. Rats ingesting lead demonstrated statistically increased incidence of kidney tumors (ATSDR 1990). According to some epidemiological studies, lead workers have an increased incidence of cancer. Data used in these studies are considered inadequate to demonstrate or refute the carcinogenicity of lead to humans. The EPA has not established toxicity values for lead.

**7.1.3.2 Cesium-137.** The radioactive isotope Cesium-137 is a fission product produced by nuclear reactors and nuclear weapons detonations. Cesium-137 is rapidly absorbed into the bloodstream and is distributed throughout the active tissues of the body. Metabolically, cesium-137 behaves as an analog of potassium and is distributed throughout the body. Its daughter, Barium-137m, an isomer, is an energetic beta and gamma radiation source and emits a 0.662-megaelectron volt gamma ray. Absorbed cesium-137 results in essentially whole-body irradiation (Amdur, Doull, and Klaassen 1991). The radioactive half-life of cesium-137 is 30 years. Its biological half-life in adults is 50 to 150 days, and in children is 44 days. The whole body is the critical organ for cesium-137 exposure.

**7.1.3.3 Mercury.** The chemistry of mercury in the environment is complex. It has various oxidation states, biotic and abiotic methylation and demethylation processes, complexation with organic and inorganic ligands, and differential solubility and volatility forms. Speciation is a major determinant of the fate, bioavailability, absorption, and toxicologic characteristics of mercury compounds.

Although the generally more toxic organic forms of mercury, such as methylmercury, are unlikely to persist in the environment, they may form in biotic tissues and are known to biomagnify through ecosystems, particularly aquatic systems (Wren 1986, Scheuhammer 1987).

Because of its chemical stability and lipophilicity, methylmercury readily penetrates the blood-brain barrier. Thus, the central nervous system is a major target organ in both mammals and birds. However, adverse reproductive effects have been reported. Methylmercury can be converted to inorganic mercury in muscle tissues. The homolytic cleavage of the mercury-carbon bond leads to generation of reactive intermediates, e.g., methyl and metal radicals, which cause cellular damage (Wren 1986; Scheuhammer 1987; Manzo et al., 1992). The inhalation “no observed adverse effects level” (NOAEL) and “lowest observed adverse effects level” (LOAEL) are 0.000 and 0.009 mg/m<sup>3</sup>, respectively (EPA 1997a).

#### **7.1.4 Risk Characterization**

The characterization of risk involves combining results of the toxicity and exposure assessments to estimate health risks. These estimates are either a comparison of exposure levels with appropriate toxicity criteria for noncarcinogens or an estimate of the lifetime cancer risk associated with a particular intake for carcinogens. The nature and weight of evidence supporting the risk estimate and the magnitude of uncertainty surrounding the estimate are also considered in risk assessment.

To determine human health risks, contaminant intakes are compared to the applicable contaminant toxicity data. The complete results of BRA risk characterization process, including risk estimates for each of the retained sites, are presented in Appendix D of the RI/FS report (DOE-ID 1999a). The generalized equations for calculating carcinogenic risk and noncarcinogenic hazard quotients from contaminant intake and toxicity information are provided in the following subsections.

**7.1.4.1 Carcinogenic Health Effects.** The following equations are used to obtain numerical estimates, (i.e., unitless probability) of lifetime cancer risks. The risk probability is the product of intake and slope factor, as follows, in Equation (7-1):

$$Risk = Intake \times SF \quad (7-1)$$

where

*Risk* = potential lifetime cancer risk (unitless)

*Intake* = chemical intake (mg/kg/day), or radionuclide intake (pCi)

*SF* = slope factor, for chemicals (mg/kg/day)<sup>-1</sup>, or radionuclides (pCi)<sup>-1</sup>.

The linear low-dose equation shown in Equation (7-1) is valid at risk levels lower than 1E-02. In accordance with EPA guidance (EPA 1989), risks that are greater than 1E-02 are calculated using the following one-hit equation, Equation (7-2):

$$Risk = 1 - \exp(-Intake \times SF) \quad (7-2)$$

where

*Risk* = potential lifetime cancer risk (unitless)

*Intake* = chemical intake (mg/kg/day), or radionuclide intake (pCi)

*SF* = slope factor: for chemicals (mg/kg/day)<sup>-1</sup> or radionuclides (pCi)<sup>-1</sup>.

To develop a total risk estimate for a given rate at a given site, cancer risks are summed across all potential carcinogens at the site as shown in Equation (7-3):

$$Risk_r = \sum Risk_i \quad (7-3)$$

where

*Risk<sub>T</sub>* = total cancer risk, expressed as a unitless probability for a given exposure and a given route

*Risk<sub>i</sub>* = risk estimate for the i<sup>th</sup> contaminant for the route.

Similarly, risk values for each exposure route are summed to obtain the total cancer risk for each site.

**7.1.4.2 Noncarcinogenic Effects.** Health risks associated with exposure to individual noncarcinogenic compounds are evaluated by calculating the hazard quotient (HQ). The HQ is the ratio of the intake rate to the reference dose, as shown in Equation (7-4):

$$HQ = Intake / RfD \quad (7-4)$$

where

$HQ$  = noncarcinogenic hazard quotient (unitless)

$Intake$  = chemical intake (mg/kg/day)

$RfD$  = reference dose (mg/kg/day).

Hazard indices are calculated by summing hazard quotients for each chemical across all exposure routes. If the hazard index for any contaminant of potential concern (COPC) exceeds unity, potential health effects may be a concern from exposure to the contaminant of potential concern. The hazard index is calculated using Equation (7-5):

$$HI = \sum \frac{Intake_i}{RfD_i} \quad (7-5)$$

where

$HI$  = hazard index for a given COPC (unitless)

$Intake_i$  = exposure level (intake) for the  $i^{th}$  COPC (mg/kg/day)

$RfD_i$  = reference dose for the  $i^{th}$  COPC (mg/kg/day).

In Equation (7-5), intake and reference doses are expressed in the same units and represent the same exposure time period. Hazard indices may be summed across multiple contaminants to develop a total hazard index for a site.

### 7.1.5 Qualitative Uncertainty Analysis

Risk assessment results depend on the methodologies applied to develop risk estimates. These analysis methods were developed over a period of several years by INEEL risk management and risk assessment professionals to provide realistic, yet conservative estimates of human health risks. Nonetheless, if different risk assessment methods had been used, the BRA would have likely produced different risk assessment results. To ensure the risk estimates are conservative (i.e., generate upper-bound risk estimates), health protective assumptions that tend to bound the plausible upper limits of human health risks were applied throughout the BRA. Therefore, risk estimates that may be calculated by other risk assessment methods are not likely to be significantly higher than estimates developed for the OU 4-13 RI/FS.

Uncertainty factors are present in all four stages of risk analysis (i.e., data collection and evaluation, exposure assessment, toxicity assessment, and risk characterization). Uncertainties associated with parameters used in the risk assessment are listed in Table 7-1. The conservative assumptions and uncertainties in risk estimates for the three sites identified for remediation are summarized in Table 7-2. Qualitative consideration of the collective impact of all the assumptions indicates that risks are more likely to be overestimated than underestimated.

**Table 7-1.** BRA human health assessment uncertainty factors.

Uncertainty factor	Effect of uncertainty	Comments and Assumptions
Source term assumptions	May overestimate risk	All contaminants are assumed to be completely available for transportation away from the source zone. In reality, some contaminants may be chemically or physically bound to the source zone and unavailable for transport.
Natural infiltration rate	May overestimate risk	A conservative value of 10 cm/year was used for this parameter.
Moisture content	May overestimate or underestimate risk	Soil moisture contents vary seasonally in the upper vadose zone and may be subject to measurement error.
Water table fluctuations	May slightly overestimate or underestimate risk	The average value used is expected to be representative of the depth over the 30-year exposure period.
Mass of contaminants in soils is estimated by assuming a uniform contamination concentration in the source zone	May overestimate or underestimate risk	There is a possibility that most of the mass of a contaminant at a site may exist in a hotspot that was not detected by sampling. If this condition existed, the mass of the contaminant used in the analysis might be underestimated. However, 95% UCLs or maximum detected contamination were used for all mass calculations, and these concentrations are assumed to exist at every point in each waste site; therefore, the mass of contaminants used in the analysis is probably overestimated.
Plug flow assumption in groundwater transport	Could overestimate or underestimate risk	Plug flow groundwater models will likely estimate a greater mass of contaminants will be transported to the aquifer than would occur under natural conditions, with respect to concentrations because dispersion is neglected, and mass fluxes from the source to the aquifer differ only by the time delay in the unsaturated zone (the magnitude of the flux remains unchanged). For nonradiological contaminants, the plug flow assumption is conservative because dispersion as completed in the models is now allowed to dilute the contaminant groundwater concentrations. For radionuclides, the plug flow assumption may or may not be conservative. Based on actual travel time, the radionuclide groundwater concentrations could be overestimated or underestimated because a longer travel time allows for more decay. If the concentration decreases because the travel time delay is larger than the neglected dilution from dispersion, the model will not be conservative.
All infiltration into WAG 4 is assumed to occur through the contaminated sites	Will overestimate risk	Infiltration that normally occurs between contaminated sites is assumed to be concentrated on contaminated sites. This assumption results on a probable overestimate of risk because more water is available in the model calculations to carry contaminants to the aquifer.
No migration of contaminants from the soil source prior to 1994	Could overestimate or underestimate risk	The effect of not modeling contaminant migration from the soil before 1994 is dependent on the contaminant half-life, radioactive in growth, and mobility characteristics.
Contaminant source terms assumed to be lognormally distributed	Could overestimate risk	If sampling data at a given site fits a normal distribution rather than a lognormal distribution, the 95% UCL of the near concentrations calculated for the site could be as much as 50% too high.

**Table 7-1.** (continued).

Uncertainty factor	Effect of uncertainty	Comments and Assumptions
Chemical form assumptions	Could overestimate or underestimate risk	In general, the methods and inputs used in contaminant migration calculations, including assumptions made about the chemical forms of contaminants, were chosen to err on the protective side. All contaminant concentration and mass are assumed available for transport. This assumption results in a probable overestimate of risk.
Exposure scenario assumptions	May overestimate risk	The likelihood of future scenarios has been qualitatively evaluated as follows: resident - improbable; industrial - credible. The likelihood of future on-INEEL residential development is small. If future residential use of this site does not occur, then the risk estimates calculated for future on-INEEL residents are likely to overestimate the true risk associated with future use of this site.
Exposure parameter assumptions	May overestimate risk	Assumptions regarding media intake, population characteristics, and exposure patterns may not characterize actual exposures.
Receptor locations	May overestimate risk	Groundwater ingestion risks are calculated for a point at the downgradient edge of an equivalent rectangular area. The groundwater risk at this point is assumed to be the risk from groundwater ingestion at every point within the WAG 4 boundaries. Changing the receptor location will affect only the risks calculated for the groundwater pathway because all other risks are site-specific or assumed constant at every point within the WAG 4 boundaries.
For the groundwater pathway analysis, all contaminants are assumed to be homogeneously distributed in a large mass of soil	May overestimate or underestimate risk	The total mass of each COPC is assumed to be homogeneously distributed in the soil volume beneath the WAG 4 retained sites. This assumption tends to maximize the estimated groundwater concentrations produced by the contaminant inventories because homogeneously distributed contaminants would not have to travel far to reach a groundwater well drilled anywhere within the WAG 4 boundary. However groundwater concentrations may be underestimated for a large mass of contamination located in a small area with a groundwater well drilled directly downgradient.
The entire inventory of each contaminant is assumed to be available for transport along each pathway	May overestimate risk	Only a portion of each contaminant's inventory is actually transported by each pathway.
Exposure duration	May overestimate risk	The assumption that an individual will work or reside at a contaminated site for 25 or 30 years is conservative. Short-term exposures involve comparison to subchronic toxicity values, which are generally less restrictive than chronic values.
Noncontaminant-specific constants (not dependent on contaminant properties)	May overestimate risk	Conservative or upper limit values were used for all parameters incorporated into intake calculations.

**Table 7-1.** (continued).

Uncertainty factor	Effect of uncertainty	Comments and Assumptions
Exclusion of some hypothetical pathways from the exposure scenarios	May underestimate risk	Exposure pathways are considered for each scenario and estimated only if the pathway is either incomplete or negligible compared to other evaluated pathways.
Poorly defined dermal absorption factor values for most WAG 4 contaminants	May underestimate risk	A lack of absorption factor values for most WAG 4 contaminants may mean that dermal absorption risks are higher than expected. The possibility of unacceptable dermal absorption from soil risks being produced by WAG 4 contaminants is considered to be unlikely.
Model does not consider biotic decay	May overestimate risk	Biotic decay would tend to reduce contamination over time.
Occupational intake value for inhalation	Slightly overestimates risk	Standard exposure factors for inhalation have the same value for occupational as for residential scenarios. The time of exposure is assumed to be the same in the risk calculations for occupational workers as it is for residents.
Use of cancer SFs	May overestimate risk	Nonradionuclide SFs are associated with upper 95th percentile confidence limits and radionuclide SFs are central estimates of cancer incidence per unit intake. They are considered unlikely to underestimate true risk.
Toxicity values are derived primarily from animal studies	May overestimate or underestimate risk	Extrapolation from animal to humans may induce error caused by differences in absorption, pharmacokinetics, target organs, enzymes, and population variability.
Toxicity values are derived primarily from high doses; most exposures are at low doses	May overestimate or underestimate risk	Assumes linearity at low doses. Tends to have conservative exposure assumptions.
Toxicity values and classification of carcinogens	May overestimate or underestimate risk	Not all values represent the same degree of certainty. All are subject to change as new evidence becomes available.
Lack of SFs	May underestimate risk	COPCs without SFs, may or may not be carcinogenic through the oral pathway.
Lack of RfDs	May underestimate risk	COPCs without RfDs may or may not have noncarcinogenic adverse effects.
Risk/HQs are combined across pathways	May overestimate risk	Not all of the COPC inventory will be available for exposure through all applicable exposure pathways.

**Table 7-2.** Summary of source-term uncertainties site with selected remedies.

ID No.	Release Sites	Source, Term Uncertainties and/or Assumptions
CFA-04	Pond (CFA-674)	Exposure point concentrations used for depth interval and volume-weighted concentrations are based on the 95% UCL or maximum detected concentration, whichever is less, instead of average (arithmetic mean) concentrations. The area of contamination is assumed to exist uniformly across the site, even though only two of the six COPCs were detected in 100% of the site-wide samples. The other COPCs were detected in at least 48.0% of the samples. The area of contamination is assumed to exist uniformly across the site. Contamination is assumed to exist down to 5.5 m (18 ft), even though positive detections of chemicals in the vadose zone are reported only to a depth of 2.4 m (8 ft bgs). The depth of contamination is based on the assumption that mobility of dissolved phase chemicals in the vadose zone (i.e., waste water) at CFA-04 is 3 m (10 ft). This assumption is made to ensure that potential risks from exposures at CFA-04 are not underestimated (Section 8). These assumptions may cause the calculated risks at the site to be overestimated.
CFA-08	Sewage Plant Drainfield	Exposure point concentrations used for depth interval and volume-weighted concentrations are based on the 95% UCL or maximum detected concentration, whichever is less, instead of average (arithmetic mean) concentrations. Of the nine calculated site-specific exposure point concentrations, seven are based on the maximum detected concentration. The area of contamination is assumed to exist uniformly across the drainfield, even though site-wide detection frequencies for each of the three COPCs are no greater than 72.3%. Contamination is assumed to exist at 10 m (32 ft) bgs. The depth to basalt is assumed to occur at 10 m (32 ft). It is assumed that COPCs will not migrate downward beyond 10 m (32 ft) due to the presence of basalt at 10 m (32 ft). These assumptions may cause the calculated risks at the site to be overestimated.
CFA-10	Transformer Yard	Exposure point concentrations used for depth interval and volume-weighted concentrations are based on the 95% UCL or maximum detected concentration, whichever is less, instead of average (arithmetic mean) concentrations. The area of contamination is the area of the site based on process knowledge that there was no specific pattern of waste disposal. The maximum depth of contamination is 0.6 m (2 ft) bgs based on depths of measured concentrations. For purposes of evaluating residential exposure pathways, contamination from 0 to 3.05 m (0 to 10 ft) soil interval is assumed. This assumption is made to ensure that potential risks from exposures at CFA-10 are not underestimated (Section 8). These assumptions may cause the calculated risks at the site to be overestimated.

## **7.2 Ecological Risk Evaluation Summary**

Results of the WAG 4 ecological risk assessment (ERA) will be integrated into an INEEL-wide evaluation of potential risks to ecological receptors as a component of the WAG 10 OU 10-04 ERA. The WAG 4 ERA was conducted as outlined in the guidance for the INEEL.

An ecological site and contaminant screening was conducted to determine which sites and contaminants would be subjected to further analysis in the comprehensive RI/FS. The screening was completed and documented as part of the OU 4-13 Work Plan (DOE-ID 1997b). A site-by-site evaluation of risks to ecological resources as a result of exposure to contaminants was developed in the RI/FS. The evaluation included a review of screening completed in the Work Plan to ensure that sites or contaminants were not inappropriately omitted from further evaluation. Complete details of the ERA are presented in Sections 7 and 8 of the OU 4-13 RI/FS report (DOE-ID 1999a). The primary components of the ERA, discussed below, include problem formulation, analysis, risk characterization, and transition to the INEEL-wide ERA.

### **7.2.1 Problem Formulation**

The goal of the problem formulation step is to investigate interactions between the stressor characteristics (i.e., contaminant characteristics), the ecosystem potentially at risk, and potential ecological effects (EPA 1992b). Site screening was conducted to identify the sites that could pose unacceptable risk.

Contaminant screening and data evaluation were conducted to identify COPCs and define exposure point concentrations. For the most part, results of the data evaluation conducted for the human health BRA were applied to the ERA. For those contaminants that were not retained for evaluation in the human health risk assessment, additional data evaluation to support the completion of the ERA was performed. Contaminant concentrations were compared to background concentrations and ecologically based screening levels. All radioactive contaminants were eliminated on the basis of this comparison.

Site-specific data characterizing contaminant concentration in biota for the INEEL ERAs are sparse. Consequently, the definition of assessment and measurement endpoints (i.e., ecological receptors) is primarily based on pathway and exposure analyses. Pathway and exposure models for contaminated surface and subsurface media were combined with a food web analysis to characterize the potential risks illustrated in the complete ERA conceptual site model (see Figure 5-2).

### **7.2.2 Analysis**

In the analysis component of the ERA, the likelihood and significance of an adverse reaction from exposure to stressors were evaluated. Exposure assessment involved relating contaminant migration to exposure pathways for ecological receptors. The behavior and fate of contaminants of potential concern in the terrestrial environment were presented in a general manner because formal fate and transport modeling was not conducted for the WAG ERA. The ecological effects assessment consisted of a hazard evaluation and a dose-response assessment. The hazard evaluation involved a comprehensive review of toxicity data for contaminants to identify the nature and severity of toxic properties. The doses from multiple media (surface and subsurface soil) identified at WAG 4 were developed and used to assess potential risk to receptors. Because dose-based toxicological criteria exist for few ecological receptors, it was necessary to develop appropriate toxicity reference values (TRVs) for contaminants and functional groups at INEEL. A semiquantitative analysis was used, augmented by qualitative information and professional judgment as necessary.

Exposures for each functional group, threatened or endangered species, and sensitive species were estimated based on site-specific life history and when possible, feeding habits. Quantification of group and individual exposures incorporated species-specific numerical exposure factors including body weight, ingestion rate, and the fraction of diet composed of vegetation or prey, and soil consumed from the affected area. Parameters used to model contaminant intakes by functional groups were derived from a combination of parameters that produced the most conservative overall exposure for the group. Parameter values and associated information sources are discussed in further detail in the RI/FS (DOE-ID 1999a). The development of TRVs for those contaminants targeted for remediation based on unacceptable ecological risks is described in the following subsections.

**7.22.1 Lead.** Lead is a ubiquitous trace constituent in rocks, soil, plants, water, and air. The average concentration of lead in the earth's crust is 16 mg/kg (Eisler 1988). Lead has four stable isotopes with the following percentages of occurrence: Pb-204 (1.5%), Pb-206 (23.6%), Pb-207 (22.6%), and Pb-208 (52.3%). Lead occurs in four valence states: (1) elemental (Pb), (2) monovalent ( $Pb^{+}$ ), (3) divalent ( $Pb^{+2}$ ), and (4) tetravalent ( $Pb^{+4}$ ). In nature, lead occurs mainly as  $Pb^{+2}$  and is oxidized to  $Pb^{+4}$ . Metallic lead is relatively insoluble in hard water; some lead salts are somewhat soluble in water. Of the organoleads, tetraethyllead and tetramethyllead are the most stable and are highly soluble in many organic solvents but are fairly insoluble in water. Both undergo photochemical degradation in the atmosphere to elemental lead and free organic radicals. Organolead compounds are primarily anthropogenic (Eisler 1988).

Lead is neither essential nor beneficial to living organisms. Lead affects the kidneys, blood, bone, and the central nervous system. The effects of lead on the nervous system are both functional and structural. Lead toxicity varies widely with the form and dose of administered lead. In general, organolead compounds are more toxic than inorganic lead. A significant cause of mortality among regulatory waterfowl is ingestion of lead shot.

Hatchlings of chickens, quail, and pheasants are relatively tolerant to moderate lead exposure (Eisler 1988). Dietary levels of 500 mg/kg had no effect on hatchling growth of these species, and levels at 2,000 mg/kg of lead had no effect on survival (Hoffman et al. 1985 as cited in Eisler 1988). For avian herbivores, a TRV was estimated using a study of mallards (Dieter and Finley 1978). Altricial species are generally more sensitive to lead than precocial species (Eisler 1988) of avian insectivores. An oral study using European starlings (Osborn, Eney, and Bull 1983) was used to generate a TRV for trimethyllead chloride. Because organic lead compounds are generally more toxic than inorganic lead, the toxicity quotients generated using this TRV should be interpreted with caution. American kestrels (*Falco sparverius*) exposed to 50 mg/kg/day of metallic lead in diets exhibited no effects on survival or reproductive success (Colle et al. 1980). Using these studies, TRVs were developed for avian functional groups.

Studies of rats administered lead in drinking water (Kimmel et al. 1980), lead toxicity of calves (Zmudzki et al. 1983), and lead toxicity of dogs (DeMayo et al. 1982) were used to develop TRVs for mammalian receptors. A critical concentration of 2,000 mg/kg of lead in food on a dry weight basis for reproduction was reported in a study on the toxicity of lead nitrate to the isopod (*Porcellio scaber*).

The recommended screening benchmark concentration for phytotoxicity in soil for lead of 50 mg/kg was used as the TRV for terrestrial plants (Suter, Will, and Evans 1993).

**7.2.2.2 Mercury.** Mercury exists in the environment in three oxidation states: the elemental state, +1 (mercurous) state, and +2 (mercuric) state. The factors that affect the predominant oxidation state in an environment are the oxidation-reduction potential and the pH of the system. Particle-bound mercury can be converted to insoluble mercury sulfide, which can be bioconverted into more soluble or volatile

forms that may reenter the atmosphere or be taken up by biota and bioaccumulated in the terrestrial food chain. Mercury forms many stable organic complexes that generally are more soluble in organic matter than in water. Inorganic and organic particles strongly sorb mercury. Mercury can be transformed in the environment by biotic and abiotic oxidation and reduction, bioconversion of organic and inorganic forms, and photolysis. Mercury can be strongly concentrated by living organisms (Callahan et al. 1979). The chemistry of mercury in the environment is complex, not only because of its various oxidation states, but also because of biotic and abiotic methylation and demethylation processes, complexation with organic and inorganic ligands, and the differential solubility and volatility of various forms. Because speciation is a major determinant of the fate, bioavailability, absorption, and toxicological characteristics of mercury compounds, lack of knowledge of the state of the mercury in INEEL soil is a large source of uncertainty in both exposure assessment and TRV development.

Though the generally more toxic organic forms of mercury are unlikely to persist in the environment, they (in particular, methylmercury) may be formed in biotic tissues and are known to biomagnify through ecosystems, particularly aquatic systems (Wren 1986; Scheuhammer 1987). Thus, to ensure that mercury TRVs for WAG ERAs are protective of receptors at all levels of ecological organization, TRVs are developed from studies of the toxic effects of organic mercury. This measure is highly conservative and tends to result in an overestimate of risks for receptors lower in the food web because the majority of mercury in soil and plants (i.e., the majority of exposures to plants and soil-dwelling and herbivorous animals) is expected to be inorganic.

Because of its chemical stability and lipophilicity, methylmercury readily penetrates the blood-brain barrier. Therefore, the central nervous system is a major target organ in both mammals and birds. However, reproductive effects have been reported at even lower doses. Methylmercury can be converted to inorganic mercury in tissues. The homolytic cleavage of the mercury-carbon bond leads to generation of reactive intermediates (e.g., methyl and metal radicals, which cause cellular damage) (Wren 1986; Scheuhammer 1987; Manzo et al. 1992).

The effects of mercury on avian herbivores, insectivores, and carnivores were evaluated. For herbivores, the effects of organic mercury compounds on galliformes (e.g., domestic chickens, quail, and pheasants) have been investigated by several groups. However, no study was reviewed that identified a NOAEL. The LOAEL for relevant endpoints (i.e., reproductive success) of several similar studies was found in a study of the effects of mercury on birds (Fimreite 1979). Reduced egg production, shell thickness, and hatchability in pheasants that were fed seed, treated with organomercurial fungicide, were observed. This study was selected over others because of its use of a wild species and lower dose levels. A TRV was derived from this study.

Three goshawks were fed a diet of chickens that had eaten wheat dressed with an organomercurial fungicide (Borg et al. 1970). Their tissues contained 10 to 40 ppm of mercury, mostly as methylmercury. The hawks died after 30 to 47 days, and their total mercury intake was about 20 mg/bird.

Two studies examined the effects of subchronic methylmercury exposure on the reproductive competence of male and female rats (Khera and Tabacova 1973; Khera 1973). The NOAEL identified for both sexes was 0.25 mg/kg/day. Much less information is available about methylmercury toxicity to herbivores. In a study of acute methylmercury toxicity in mule deer (*Odocoileus hemionus*), 17.88 mg/kg was said to be the lethal dose of 50% of the exposed organisms (Eisler 1987). A number of studies have examined the effects of chronic methylmercury ingestion on carnivorous mammals, particularly house cats (e.g., Albanus et al. 1972; Charbonneau et al. 1976; Eaton, Secord, and Hewitt 1980) and mink (e.g., Aulerich, Ringer, and Iwamoto 1974; Wobeser, Neilson, and Schiefer 1976; Wren et al. 1987). The study of the chronic toxicity of house cats was considered superior to other available studies because of its long duration (two years), use of relatively large group sizes, detailed examination of endpoints,

identification of both no-effect and effect levels, and administration of mercury via both contaminated fish and addition to diet (Charbonneau et al. 1976).

A TRV of 0.3 mg/kg was assigned for mercury for terrestrial plants based on the toxicological benchmark (Suter, Will, and Evans 1993).

### 7.2.3 Risk Characterization

Risk characterization is the final step of the ERA process. The risk evaluation determines whether risk is indicated from the contaminant concentrations and the calculated dose for the INEEL functional groups, threatened or endangered species, and species of concern. The risk characterization considers the uncertainty inherent in the assessment. For a WAG ERA, the risk characterization step has two components: a description of estimation of risk, and a summary of results.

Risk is estimated by comparing the calculated dose to the TRV. If the dose from the contaminant does not exceed its TRV (i.e., if the HQ is less than 1.0 for nonradiological contaminants), adverse effects to ecological receptors from exposure to that contaminant are not expected and no further evaluation of that contaminant is required. Hence, the HQ is an indicator of potential risk. Hazard quotients are calculated using Equation (7-6):

$$HQ = \frac{Dose}{TRV} \quad (7-6)$$

where

<i>HQ</i>	=	hazard quotient (unitless)
<i>Dose</i>	=	from all media (mg/kg/day)
<i>TRV</i>	=	toxicity reference value (mg/kg/day).

HQs were derived for all contaminants, functional groups, threatened or endangered species, and species of concern identified in WAG 4 for each site of concern. When information is not available to derive a TRV, then an HQ cannot be developed for that particular contaminant and functional group or species combination.

An HQ greater than the threshold value indicates that exposure to a given contaminant, at the concentrations and for the duration and frequencies of exposure estimated in the exposure assessment, may cause adverse health effects in exposed populations. However, the level of concern associated with exposure may not increase linearly as the HQ values exceed the threshold value. Therefore, the HQs cannot be used to represent a probability or a percentage because an HQ of 10 does not necessarily indicate that adverse effects are 10 times more likely to occur than an HQ of 1. It is only possible to infer that the greater the HQ, the greater the concern about potential adverse effects to ecological receptors.

In general, the significance of a HQ exceeding 1 depends on: (a) the perceived “value” (i.e., ecological, social, or political) of the receptor (or species represented by that receptor), (b) the nature of the endpoint measured, and (c) the degree of uncertainty associated with the process as a whole. Therefore, the decision to take no further action, order corrective action, or perform additional assessment must be determined on a site-, chemical-, and species-specific basis. With the exception of threatened or endangered species (EPA 1992b), the unit of concern in ERA is usually the population as opposed to the

individual. Therefore, exceeding conservative screening criteria does not necessarily mean that significant adverse effects to populations of receptors are likely.

Three sites, CFA-04, CFA-08, and CFA-10, with ecological HQs up to 30,000, 30, and 5,000 respectively, were retained for evaluation of remedial alternatives in the Comprehensive Feasibility Study (DOE-ID 1999a). These sites also pose an unacceptable risk to human health. Six other sites will be evaluated for ecological risk as part of the WAG 10 Sitewide assessment. These sites are CFA-01, CFA-02, CFA-05, CFA-13, CFA-41, and CFA-43.

Principal sources of uncertainty apply to the use of data not specifically collected for ERA and in the development of exposure assessment. Uncertainties inherent in exposure assessment are associated with estimated receptor ingestion rates, selected acceptable HQs, estimated site usage, and estimated risk assessment parameters (e.g., plant uptake factors and bioaccumulation factors). Additional uncertainties are associated with the depicted site characteristics, the determined nature and extent of contamination, and the derived TRVs. A large area of uncertainty is the inability to evaluate risk to many receptors because of the lack of appropriate toxicity data for many chemicals. This is especially a problem for certain receptors such as reptiles. In addition, because of the conservative nature of assumptions made to compensate for the lack of site-specific uptake and bioaccumulation factors, ecologically based screening levels for some chemicals are lower than their sample quantitation and detection limits. In WAG-4 analysis, this occurs for metals, polychlorinated biphenyls (PCBs), and some other organics. All of these uncertainties likely influence risk estimates. Major sources and effects of uncertainties in the ERA are reviewed in Table 7-3.

#### **7.2.4 Transition to the INEEL-Wide Ecological Risk Assessment**

The third phase of the ERA process is WAG 10 (OU 10-04) ERA, which will integrate WAG ERAs to evaluate risk to the INEEL-wide ecological resources. This assessment will evaluate effects resulting from past contamination, and their potential for adversely impacting the INEEL-wide ecological resources including residual impacts from completed remedial actions.

Sites identified in the WAG 4 ERA with an HQ greater than 10, and a concentration greater than 10 times the background concentration, will be considered in the INEEL-wide ecological risk assessment. The INEEL-wide ERA will be conducted as a component of the comprehensive RI/FS for OU 10-04. The WAG 10 comprehensive investigation will be referenced during the five-year review process for WAG 4 to determine if the decisions implemented by WAG 4 are still protective of the environment. If the OU 10-04 ERA determines that those WAG 4 sites screened at greater than 10 times background, or HQ greater than 10, require further action, it will be determined during the WAG 4, five-year review. Future remediation may be necessary if the WAG 10 INEEL-wide assessment indicates that a cumulative ecological risk is exceeded for a population of receptors or if land-use changes.

### **7.3 Risk Assessment Summary**

The human health and ERA results are summarized in Table 7-4. The risks and HQ for the three sites and their COCs selected for remedial action are shown.

At the CFA-04 Pond, risk assessment calculations indicate that mercury poses a potential unacceptable risk to future residential receptors via ingestion of homegrown produce. The calculated hazard index for this exposure route is 80. Cancer risk at CFA-04 was less than 1E-04. Mercury was detected at depths to 0.6 m (2 ft) below pond bottom. Mercury also poses an ecological risk at CFA-04.

**Table 7-3.** Sources and effects of uncertainties in the ecological risk assessment.

Uncertainty Factor	Effect of Uncertainty (Level of Magnitude)	Comment
Estimation of ingestion rates (soil and food)	May overestimate or underestimate risk (moderate)	Few intake (ingestion) estimates used for terrestrial receptors are based on data in the scientific literature (preferably site-specific) when available. Food ingestion rates are calculated by using allometric equations available in the literature (Nagy 1987). Soil ingestion values are generally from (Beyer et al. 1994).
Estimation of bioaccumulation and plant uptake factors	May overestimate or underestimate risk and the magnitude of error cannot be quantified (high)	Few bioaccumulation factors or Plant Uptake Factors are available in the literature because they must be both contaminant- and receptor-specific. In the absence of more specific information, Plant Uptake Factors and bioaccumulation factors for metals and elements are obtained from (Baes et al. 1994), and for organic compounds from (Travis and Arms 1988).
Use of human health exposure concentrations	May overestimate (high) risk	Exposure concentrations were derived from data obtained as a product of biased sampling of WAG 4 sites. Samples were generally obtained from areas where contamination was believed the greatest.
Estimation of toxicity reference values	May overestimate (high) or underestimate (moderate) risk	To compensate for potential uncertainties in the exposure assessment, various adjustment factors are incorporated to extrapolate toxicity from the test organism to other species.
Use of functional grouping	May overestimate (high) risk	Functional groups were designed as an assessment tool that would ensure that the ERA would address all species potentially present at the facility. A hypothetical species is developed using input values to the exposure assessment that represents the greatest exposure of the combined functional group members.
Site use factor	May overestimate (high) or underestimate (moderate) risk	Site use factor is a percentage of the site of concern compared to the home range. This is extrapolated from literature values and allometric equations and may vary from season to season and year to year depending on environmental conditions. It is highly uncertain.

**Table 7-4.** Summary of major risks and hazard quotients at individual sites and contaminants of concern that are addressed by the selected remedy for WAG 4.

Site	COC	Exposure Pathway	Risk	Hazard Quotient
Future Residential Exposure Scenario				
CFA-04	Mercury	Ingestion of homegrown produce	b	80
CFA-08	Cesium-137	External radiation exposure	4E-04	NA <sup>d</sup>
CFA-10	Lead	Ingestion of soil	a	a
Current Occupational Scenario				
CFA-04	Mercury	Ingestion of soil	b	0.3
CFA-08	Cesium-137	External radiation exposure	2E-03	NA <sup>d</sup>
CFA-10	Lead	Ingestion of soil	a	a
Future Occupational Scenario				
CFA-04	Mercury	Ingestion of soil	b	0.3
CFA-08	Cesium-137	External radiation exposure	2E-04	NA <sup>d</sup>
CFA-10	Lead	Ingestion of soil	a	a
Ecological Risk Assessment				
CFA-04	Mercury	Ecological exposure		<1 to 30,000
CFA-10	Lead	Ecological exposure		<1 to 5,000
CFA-10	Copper	Ecological exposure		<1 to 70 <sup>c</sup>
<p>a. Risks and hazard quotients could not be estimated for lead because human health toxicity data are not available. However, concentrations in excess of the EPA screening level of 400 mg/kg (EPA 1994b) will be remediated.</p> <p>b. Risk is less than 1E-04</p> <p>c. Copper contamination exists in the surface soil and any remedial action for lead contamination is expected to also remove copper.</p> <p>d. NA–Not Applicable</p>				

The carcinogenic risks at the CFA-08 Drainfield are greater than 1E-04 for external radiation exposure to current and future occupational workers and future residents to cesium-137. The noncarcinogenic HI at CFA-08 is less than one. Cesium-137 was detected from ground surface to between 1.2 m (4 ft) and 2.4 m (8 ft) bgs. Concentrations of cesium-137 are highest in the top 0.9 m (3 ft) of soil.

Lead was detected in surface soil between 0 to 0.6 m (0 to 2 ft) bgs at the CFA-10 Transformer Yard site. There are no toxicity data available for lead. Five samples reported concentrations above the 400 mg/kg EPA screening level. Lead also poses a risk to ecological receptors at CFA-10.

Groundwater risks were evaluated for 26 COCs identified in the OU 4-13 RI/FS (DOE-ID 1999a). The GWSCREEN modeling results indicate that WAG 4 does not contain sources of contamination that have the potential to produce risk greater than 1E-04 or an HQ greater than 1 for those COCs via the groundwater pathways (e.g., groundwater ingestion). No collection of sites showed risks in the air and groundwater residential scenarios greater than threshold values.

## **8. CONTAMINATED SOIL SITES CFA-04, CFA-08, AND CFA-10**

Remedial actions are required for three soil sites: (1) the CFA-04 Pond, (2) the CFA-08 Drainfield, and (3) the CFA-10 Transformer Yard site. Sections 8.1 through 8.3 address each of the sites, including the nature and extent of contamination and BRA results. More detailed information about the contaminated soil sites may be found in the OU 4-13 RI/FS report (DOE-ID 1999a).

### **8.1 CFA-04 Pond (OU 4-05)**

The CFA-04 pond will be remediated to address the threat to human health and ecological receptors from mercury in soil. A summary of the site history, site investigations, nature and extent of contamination and estimated risks are presented below.

The CFA-04 Pond is a shallow, unlined surface depression that was originally a borrow pit for construction activities at the CFA. It is approximately 152 x 46 m (500 x 150 ft) and roughly 2 to 2.4 m (7 to 8 ft) deep; basalt outcrops are present within and immediately adjacent to the pond. It received laboratory wastes from the Chemical Engineering Laboratory (CEL) in Building CFA-674 between 1953 and 1969. The CEL was used to conduct calcine experiments on simulated nuclear wastes. (The calcining process was later used on actual nuclear wastes at the INEEL to change them from a liquid to a solid and to effect an overall volume reduction.) The CEL experiments used mercury to dissolve simulated aluminum fuel cladding as well as radioisotope tracers in the calcining process. The primary waste streams discharged to the pond from the CEL included approximately 76.5 m<sup>3</sup> (100 yd<sup>3</sup>) of mercury-contaminated calcine that contained low-level radioactive wastes and liquid effluent from the laboratory experiments. Additionally, there is approximately 382 m<sup>3</sup> (500 yd<sup>3</sup>) of rubble, consisting of laboratory bottles, asphalt and asbestos roofing materials, reinforced concrete and construction and demolition debris. The pond received runoff from the CFA site periodically between 1953 and 1995.

#### **8.1.1 Site Investigations**

The CFA-04 Pond was identified as a Track 2 investigation site in the FFA/CO (DOE-ID 1991). Visual inspections in 1994 revealed the presence of calcine on the bermed areas around the periphery of the pond. Following surface and subsurface soil data collection from the calcine and the pond berm in early and mid-1994, a time-critical removal action in September 1994 excavated approximately 218 m<sup>3</sup> (285 yd<sup>3</sup>) of calcine and calcine-contaminated soil and a small amount of asbestos from the bermed area. The soil was remediated at a portable retort set up northeast of the pond. Verification soil sampling conducted after the removal action showed that the bermed areas had residual mercury concentration up to 233 mg/kg (DOE-ID 1999a).

During the 1995 Track 2 investigation, additional soil samples were collected from the pond inlet area as well as a deeper area of the pond near the inlet where laboratory effluent may have collected. The results of the 1994 and 1995 soil investigations revealed that concentrations of the following constituents exceeded background concentrations for the INEEL: aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, lead, magnesium, mercury, nickel, cesium-137, palladium-234m, strontium-90, thorium-234, uranium-234, uranium-235 and uranium-238. Aroclor-1254 was also detected at low levels. Preliminary risk screening indicated that the following constituents detected at the pond posed potential human health risks: aroclor-1254, arsenic, mercury, cesium-137, uranium-234, uranium-235, and uranium-238. On this basis, the site was recommended for further characterization in the OU 4-13 RI/FS (INEEL 1996b).

Additional soil samples were collected for the OU 4-13 RI/FS during 1997 and 1998 at four areas

along the length of the pipe connecting the CEL to the pond, in the area northeast of the pond known as the windblown area, and from the pond bottom. Data from these investigations confirmed the presence of mercury in these areas at concentrations up to 439 mg/kg (DOE-ID 1999a). Four of 88 samples exceeded the mercury RCRA characteristic hazardous waste level of 0.2 mg/L. Three of the four samples were in close proximity to one another in the pond and the fourth was an isolated occurrence in the windblown area and was eliminated. A contour line was drawn around the three closely spaced samples and the area was estimated. The depth of soil in the pond was conservatively estimated to be 2.4 m (8 ft) in the pond bottom and 0.15 m (0.5 ft) in the wind blown area, indicating that approximately 612 m<sup>3</sup> (800 yd<sup>3</sup>) of soil is potentially characteristic waste per RCRA and is subject to Land Disposal Restrictions upon excavation.

### 8.1.2 Nature and Extent of Contamination

The only contaminant that poses an unacceptable risk to human health and the environment is mercury. Mercury-contaminated soil is present in the pond bottom, around the pond periphery in the berms, along the pipe connecting the CEL to the pond, and in the area northeast of the pond as a result of windblown contamination, an area encompassing approximately 183 x 91 m (600 x 300 ft) (Figure 8-1). The OU 4-13 RI/FS conservatively estimated the volume of mercury-contaminated soil to be approximately 6,338 m<sup>3</sup> (8,290 yd<sup>3</sup>), based on the dimensions of the pond bottoms, wind blown area and pipeline at depths of 2.4 m (8 ft), 0.15 m (0.5 ft), and 1.8m (6 ft) respectively.

### 8.1.3 Summary of Site Risks

The CFA-04 Pond was retained for quantitative risk analysis in the OU 4-13 RI/FS to evaluate human health risks from aroclor-1254, arsenic, mercury, cesium-137, Ra-226, U-234, U-235, U-238; and ecological risks from arsenic, barium, cadmium, chromium-III, cobalt, copper, lead, mercury, nickel, nitrate, silver and vanadium. Refer to the OU 4-13 RI/FS (DOE 1999a) for the details of the risk assessment process.

**8.1.3.1 Human Health Risk Assessment.** Mercury was identified as the only contaminant that poses an unacceptable risk to human health at CFA-04 with a noncarcinogenic HQ of 80. Table 8-1 summarizes the data for mercury at the CFA-04 Pond.

The estimated total risk for the current and future occupational worker is less than 1E-04. The noncarcinogenic hazard index for both current and future occupational scenarios is less than 1.

The total excess cancer risk, from the BRA, for the future residential scenario is 4E-05 (4 in 100,000). The estimated HQ for future residential scenario is 80. The majority of the noncancer risk is from mercury (97%) and the exposure route is ingestion of homegrown produce.

**8.1.3.2 Ecological Risk Assessment.** Mercury is the only contaminant that poses an unacceptable risk to ecological receptors. The maximum concentration of 439 mg/kg results in a hazard quotient of 30,000 (DOE-ID 1999a).

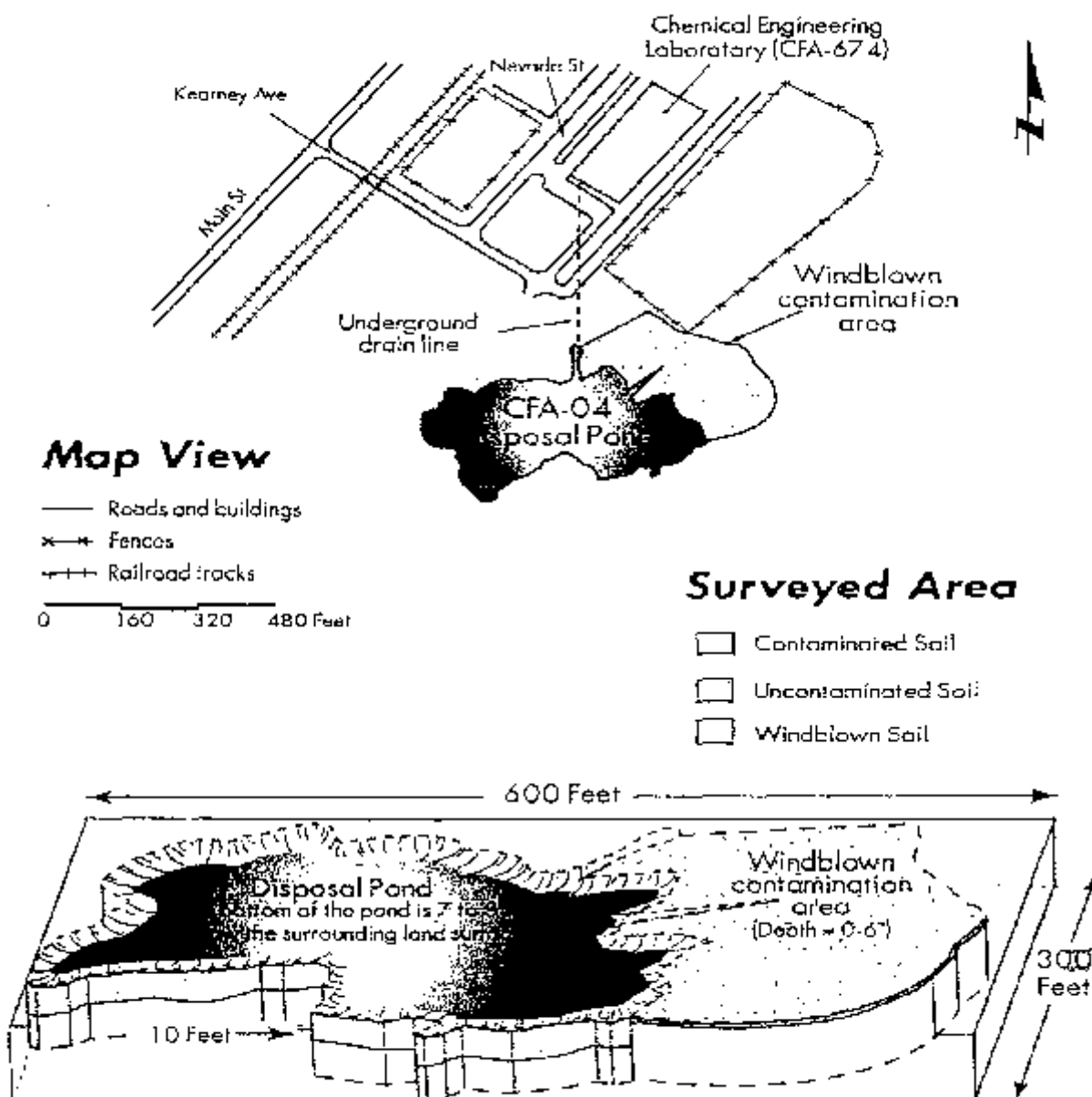
**Table 8-1.** Summary data for the human health and ecological COC at the CFA-04 Pond.

Contaminant of Concern	Units	Number of Samples	Number of Detections	Minimum Detected	Maximum Detected	Exposure Point Concentration	INEEL Background Concentration <sup>a</sup>
<b>Human Health</b>							
Mercury	mg/kg	267	247	0.9	439	146 <sup>b</sup>	0.05
<b>Ecology</b>							
Mercury	mg/kg	267	247	0.9	439	439 <sup>c</sup>	0.05

a. The background value for composited samples from INEEL 1996a.

b. Volume weighted average 95% UCL concentrations.

c. Maximum concentration detected.



**Figure 8-1.** Pond (CFA-04).

## **8.2 CFA-08 Sewage Plant Drainfield (OU 4-08)**

The CFA-08 (SP) Drainfield will be remediated to address the threat to human health from external radiological exposure from cesium-137 in soil. A summary of the site history, site investigations, nature and extent of contamination, and estimated risks are presented in this subsection.

The Navy first operated a sewage treatment facility at CFA from 1944 through 1953. This system consisted of a septic tank (CFA-716), a sludge drying bed, and two distribution areas. In 1953, a new system was constructed that utilized the original septic tank, a new sludge drying bed, and an expanded drainfield with additional distribution areas equipped with trickling filters, digesters, and two clarifiers. This system operated, with some modifications, until February 1995. It received effluent from sewage waste lines from chemical laboratories, craft shops, warehouses, photographic services, vehicle services, a medical dispensary, a maintenance repair shop and laundry facilities that processed low-level radiologically contaminated clothing. Average flow through the SP ranged between 416,350 L (110,000 gal) to 662,375 L (175,000 gal)/day (INEEL 1995c).

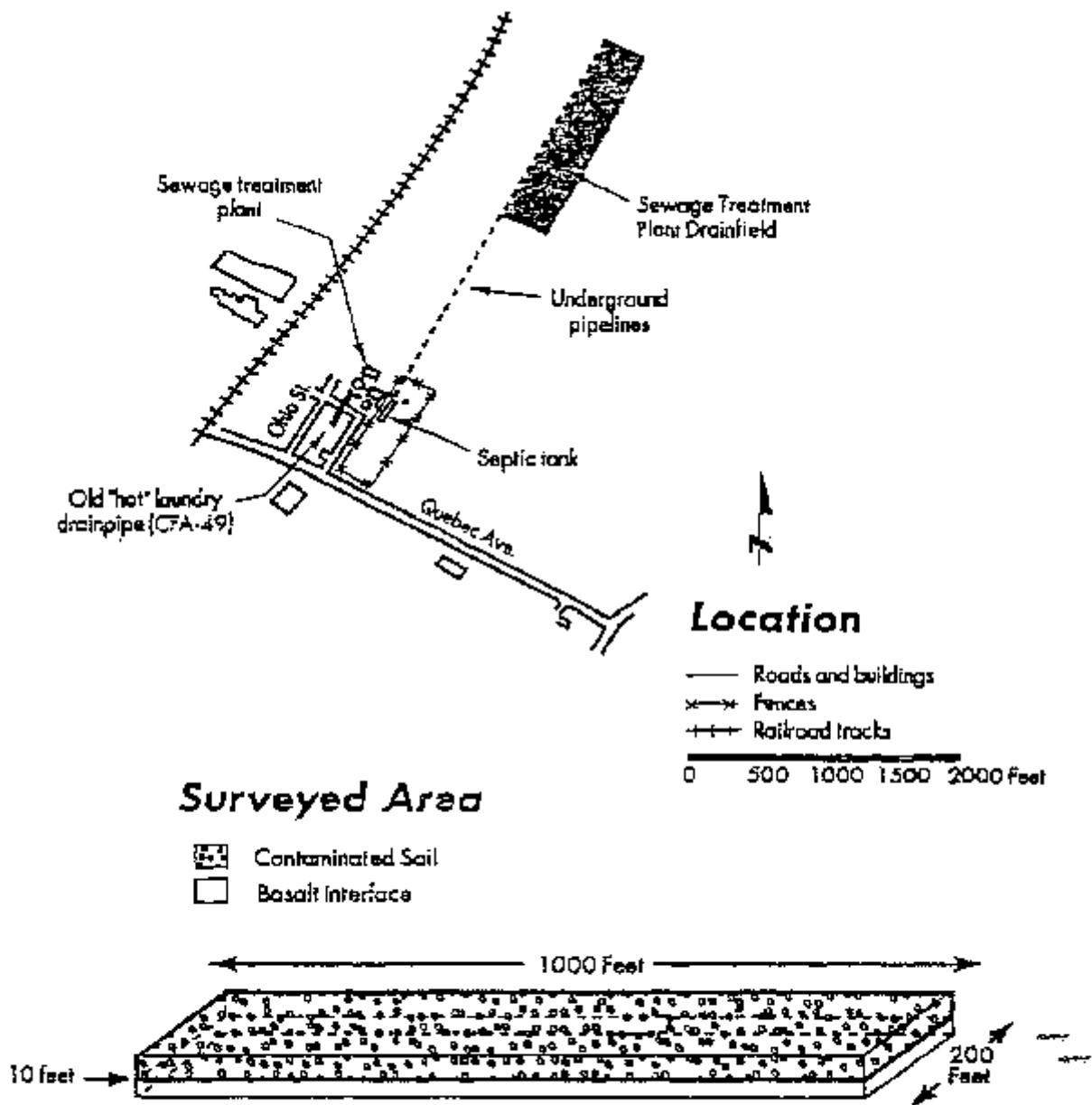
The CFA-08 site comprises three components in the FFA/CO (DOE-ID 1991): the SP building (CFA-691), the septic tank inside the SP (CFA-716) and the drainfield (Figure 8-2). Potential releases from the SP, the septic tank and associated piping/pipelines were investigated during decontamination and dismantlement activities that commenced in 1996. Those data were evaluated in the BRA portion of the OU 4-13 RI/FS (DOE-ID 1999a). The BRA concluded that concentrations of metals, radionuclides, herbicides, PCBs, volatile organic compound (VOCs), and SVOCs at the SP and the pipeline between the SP and the drainfield do not pose an unacceptable risk to human health and the environment. Those portions of the CFA-08 site require no further action.

The CFA-08 drainfield is approximately 61 x 305 m (200 x 1000 ft) with linear trenches that are approximately 1.8 m (6 ft) deep. It contains five distribution areas, each with 20 concrete drain pipes approximately 1.1 m (3.5 ft) bgs. The distribution pipes are surrounded by screened gravel in linear trenches 0.76 m (2.5 ft) wide, 1.8 m (6 ft) deep, and 61 m (200 ft) long. Basalt bedrock is encountered between 20 and 32 ft bgs in the vicinity of the drainfield. A sedimentary interbed was encountered at depths of approximately 102 ft bgs in two borings drilled adjacent to the drainfield (INEEL 1995c).

### **8.2.1 Site Investigations**

The 1993 Track 2 investigation focused only on delineating potential releases from the drainfield because the SP, septic tank, and associated building piping were to be addressed under Decontamination and Deactivation activities (INEEL 1995d). Soil samples were collected from eight borings inside the drainfield, two borings outside the drainfield, and the Naval sludge drying bed. Perched water samples were obtained from two shallow wells within the drainfield and one well outside the drainfield at 102 ft bgs. Additionally, a radiological survey was performed over the soil surface downwind of the drainfield. Soil and water samples were analyzed for Contract Lab Program metals, VOCs, semi-volatile organic compounds, PCBs, tritium, and alpha, beta, and gamma-emitting radionuclides.

Concentrations of contaminants detected in the Naval sludge drying bed do not pose an unacceptable risk to human health or the environment. No windblown radiologic contamination above background levels was detected in surface soils downwind of the drainfield. Low levels of arsenic, barium, manganese, zinc and radionuclides were detected in the perched water samples. However, the perched water zones dissipated shortly after the SP ceased operation in 1995 (DOE-ID 1999a). The Track 2 preliminary scoping identified the following contaminants of concern for the CFA-09 drainfield: aroclor-1254, aroclor-1260, beryllium, cobalt-60, cesium-137, europium-152, europium-154, U-234, U-238, and Pu-239/240.



**Site OU 4-08, CFA-08 Sewage Treatment Plant Drainfield**

**Figure 8-2.** Sewage Plant Drainfield (CFA-08).

The OU 4-13 RI/FS investigation at the CFA-08 drainfield focused on collecting additional soil samples inside the drainfield and determining the lateral extent of contamination outside of the drainfield. The contaminant screening process retained aroclor-1254, cesium-137, Pu-239/240, and U-235 for evaluation of human health risks in the BRA.

## 8.2.2 Nature and Extent of Contamination

The nature and extent of contamination was estimated in the OU 4-13 RI/FS to be defined by the perimeter of the drainfield and estimated to be to a depth of 3.1 m (10 ft) bgs. The total volume is approximately 56,577 m<sup>3</sup> (74,000 yd<sup>3</sup>).

## 8.2.3 Summary of Site Risks

The CFA-08 drainfield was retained for quantitative risk analysis in the BRA to evaluate human health risks from aroclor-1254, cesium-137, plutonium-239/240, and uranium-235. Ecological risks were evaluated for chloromethane, chromium-III, copper, lead, mercury, nickel, selenium, aroclor-1254, benzo(a)pyrene, and silver. Please refer to the OU 4-13 RI/FS (DOE 1999a) for the details of the risk assessment process. Refer to the OU 4-13 RI/FS (DOE 1999a) for the details of the risk assessment process.

**8.2.3.1 Human Health Risk Assessment.** Cesium-137 is the only contaminant at the CFA-08 drainfield that poses an unacceptable risk to human health. The maximum concentration of cesium-137 is 180 pCi/g and the exposure route is external exposure. Table 8-2 summarizes the cesium-137 data.

The total excess cancer risk for the current occupational work is 2E-03 (2 in 1,000). The majority of this risk (99%) is from external exposure to radiation from cesium-137 in soil. The noncarcinogenic hazard index is less than 1.

The total excess cancer risk for the future occupational work is 2E-04 (2 in 10,000). The major contributor is external exposure to radiation from cesium-137 in soil. The noncarcinogenic hazard index is less than 1.

The total excess cancer risk for the future residential scenario is 4E-04 (4 in 10,000). The majority of the risk (99%) is attributable to external radiation exposure to cesium-137 in soil. The noncarcinogenic hazard index is less than 1.

**8.2.3.2 Ecological Risk Assessment.** The ecological risk assessment determined that no contaminants pose an unacceptable risk to ecological receptors.

**Table 8-2.** Summary data for the human health COC at the CFA-08 drainfield.

Contaminant of Concern	Units	Number of Samples	Number of Detections	Minimum Detected	Maximum Detected	Exposure Point Concentration	INEEL Background Concentration <sup>a</sup>
<b>Human Health</b>							
Cesium-137	pCi/g	65	47	0.08	180	88.9 <sup>b</sup>	1.28
a. The background value for composited samples (INEEL 1996a.)							
b. Volume weighted average 95% UCL concentrations.							

### **8.3 CFA-10 Transformer Yard (OU 4-09)**

The CFA-10 site will be remediated to address the threat to human health and ecological receptors posed by lead-contaminated soil. A summary of the site investigations, nature and extent of contamination, and estimated risks are presented below.

The Transformer Yard site (see Figure 8-3) is an area approximately 19.8m x 42 m. The building and yard area were used for welding and metalworking between approximately 1958 and 1985 (INEEL 1996a). From 1985 to 1990, electrical transformers were stored on the concrete pad. Process knowledge indicates that the yard was not used for waste disposal, but accidental spills may have occurred at the site. Potential contaminants were identified as metals and PCBs in the Track 2 scoping process.

#### **8.3.1 Site Investigations**

The CFA-10 Transformer Yard site was identified as a Track 2 investigation site in the FFA/CO (DOE-ID 1991). Six surface soil samples were collected in the Track 2 investigation for PCB analyses and four samples were analyzed for metals. Two of seven possible PCBs were detected: aroclor-1254 and aroclor-1260 with maximum concentrations of 1.4 and 1.3 mg/kg, respectively. The Track 2 investigation identified arsenic, lead, aroclor-1254 and aroclor-1260 as COPCs, and the site was carried forward to the OU 4-13 RI/FS.

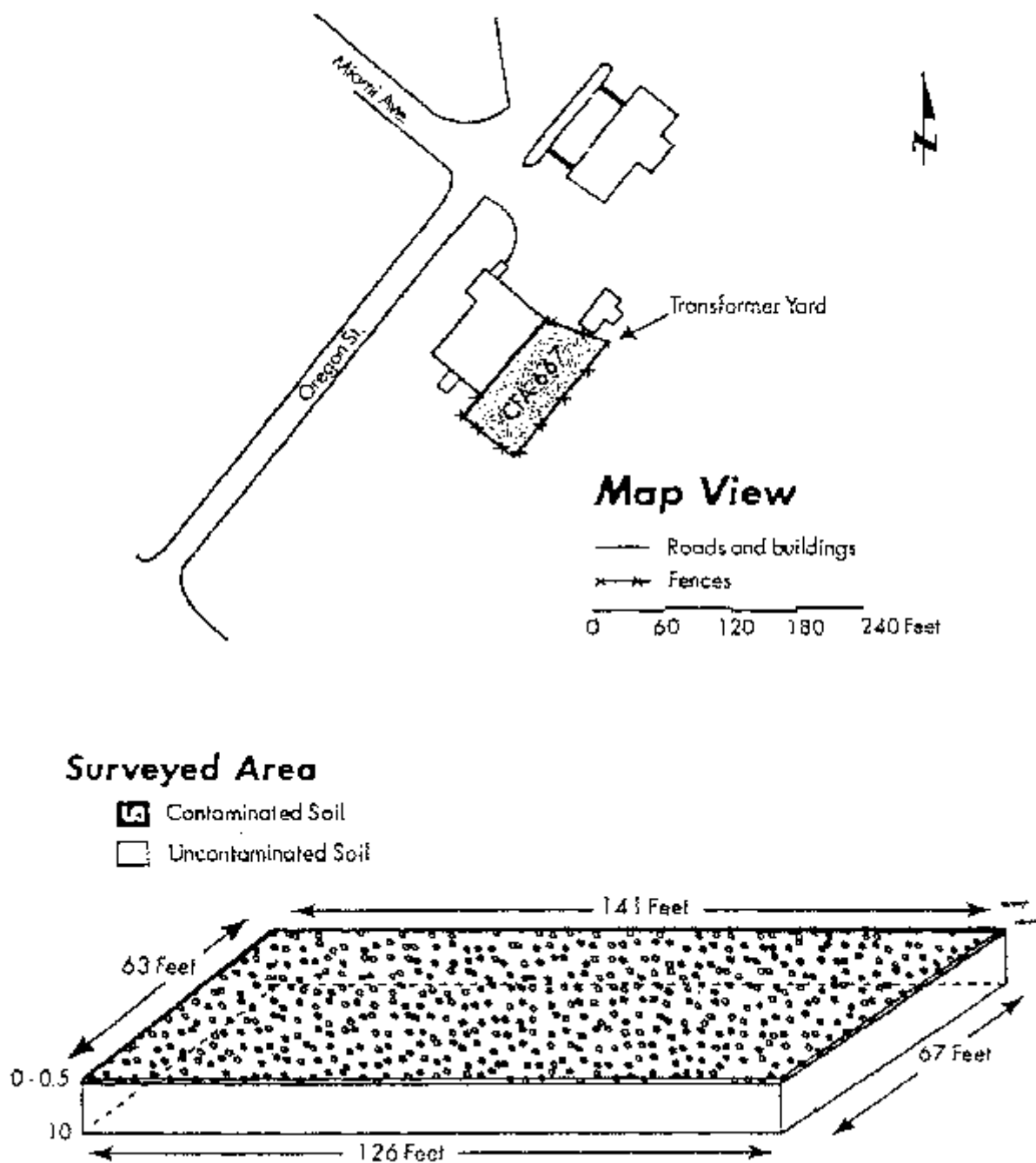
As part of the OU 4-13 RI/FS investigation, soil samples were collected at four additional locations for lead analyses. At each location, samples were collected at the surface and at depths of 0.3 m (1 ft) and 0.6 m (2 ft) bgs. The average lead concentration for the surface soil, soil at 0.3 m (1 ft) bgs, and soil at 0.6 m (2 ft) bgs is 1,848, 64, and 18 mg/kg, respectively. Only the average lead concentration for the surface soil exceeds the EPA residential lead screening level of 400 mg/kg. Additionally, samples collected from the three depths at the four locations were analyzed by the TCLP for lead; two samples exceeded the toxicity characteristic level for lead. Aroclor-1254 and aroclor-1260 were retained for evaluation of human health risk; lead was evaluated against the EPA screening criterion.

#### **8.3.2 Nature and Extent of Contamination**

The extent of contamination at the CFA-10 Transformer Yard encompasses the dimensions of the yard to a depth of 0.15 m (0.5 ft). The volume of lead-contaminated soil is estimated to be 123 m<sup>3</sup> (160 yd<sup>3</sup>). Subsurface data indicate that lead concentrations above 400 mg/kg are confined to the upper 0.15 m (0.5 ft) of the yard.

#### **8.3.3 Summary of Site Risks**

Because there are no toxicity data for lead, lead concentrations were compared to the EPA screening criterion. Aroclor-1254 and aroclor-1260 were evaluated for potential risk to human health in the BRA. Antimony, arsenic, cadmium, chromium III, cobalt, copper, lead, manganese, mercury, nickel, zinc, and aroclor-1254 were evaluated for potential risks to ecological receptors. Please refer to the OU 4-13 RI/FS for the details of the risk assessment process.



**Figure 8-3.** The Transformer Yard (CFA-10).

**8.3.3.1 Human Health Risk Assessment.** Lead is the only contaminant that poses an unacceptable risk to human health at CFA-10. Concentrations in the top 0.5 ft of soil exceed the EPA residential screening level of 400 mg/kg. Lead also poses an unacceptable ecological risk above 10 times background (170 mg/kg), in the top 0.15 m (0.5 ft) of soil. Data for lead at CFA-04 are summarized in Table 8-3.

The total excess cancer risk for the current and future occupational scenarios is less than 1E-04. The noncarcinogenic hazard quotient is less than 1 for both the current and future occupational scenarios.

**8.3.3.2 Ecological Risk Assessment.** Lead and copper were identified as a contaminant that poses unacceptable risks to ecological receptors at CFA-10. The exposure point concentration of 5,560 mg/kg for lead has a calculated hazard quotient of 5,000. The maximum copper concentration of 259 mg/kg is only slightly above the 10 background criteria of 220 mg/kg in one sample of four detected samples. Data for lead and copper are summarized in Table 8-3.

**Table 8-3.** Summary of data for the human health and ecological COC at the CFA-10 Transformer Yard.

Contaminant of Concern	Units	Number of Samples	Number of Detections	Minimum Detected	Maximum Detected	Exposure Point Concentration	INEEL Background Concentration <sup>a</sup>
<b>Human Health</b>							
Lead	mg/kg	17	17	16.5	5,560	305 <sup>b</sup>	17
<b>Ecological</b>							
Lead	mg/kg	17	17	16.5	5,560 <sup>c</sup>	5,560	17
Copper <sup>c</sup>	mg/kg	4	4	36	259	259	22

a. The background value for composited samples from INEEL 1996a.

b. Volume weighted average 95% UCL concentrations

c. Copper contamination was detected at the same depth of surface soil where lead contamination is and a remedial action for lead contamination is expected to also remediate the copper. Therefore, copper will not be evaluated as a COPC in the FS.

## **9. REMEDIAL ACTION OBJECTIVES AND FINAL REMEDIATION GOALS**

The remedial action objectives (RAOs) and final remediation goals (FRGs) for sites CFA-04, CFA-08, and CFA-10 are discussed below. The remedial alternatives were evaluated collectively in the Feasibility Study, and are presented similarly in this ROD. Sections 9 through 11 address the remedial alternatives for each of the three sites. The remedial alternatives, a comparison of these alternatives, and the selected remedies are presented.

### **9.1 Remedial Action Objectives**

These RAOs are based on the results of both human health and ecological risk assessments and are specific to the COCs and exposure pathways for each of the three sites.

The RAOs were developed in accordance with the NCP and CERCLA RI/FS guidance (EPA 1988) and refined through discussions among the Agencies (IDHW, EPA Region 10, and DOE-ID). During development of the RAOs it was assumed that CFA would serve as the primary area at INEEL for technical service and support functions for the next 100 years with access restrictions and other administrative and physical security controls.

Based on these assumptions the RAOs are to:

- Prevent direct exposure to radionuclide COCs that would result in a total excess cancer risk greater than 1 in 10,000
- Prevent ingestion and inhalation of radionuclide and nonradionuclide COCs that would result in a total excess cancer risk greater than 1 in 10,000, or a total of hazard index greater than 1.0
- Prevent exposure to lead at concentrations over 400 mg/kg, the EPA residential screening level for lead
- Prevent exposure of ecological receptors to contaminated soil with concentrations greater than or equal to a screening level of 10 times background values that result in a hazard quotient greater than or equal to 10.
- Monitor the groundwater at WAG 4 until the nitrate level falls below the MCL of 10 mg/L.

### **9.2 Final Remediation Goals for the Selected Alternatives**

The FRGs developed in the OU 4-13 RI/FS (DOE-ID 1999a) are based on risk-specific doses, applicable or relevant and appropriate requirements (ARARs), or EPA guidance and are summarized in Table 9-1. For sites, CFA-04 and CFA-10, the FRGs are based on screening level goals rather than further intensive analysis and the additional cost of further study, which would be necessary to refine the FRGs.

**Table 9-1.** Final Remediation Goals for sites with selected alternatives.

Site	Contaminant	FRG	Basis
CFA-04-Pond	Mercury	0.50 mg/kg	Ecological goal based on ten times average background concentration for composited samples. <sup>a</sup>
CFA-08 Sewage Plant Drainfield	Cesium-137	2.3 pCi/g <sup>b</sup>	Human health goal. See Footnote b.
CFA-10 Transformer Yard	Lead	400 mg/kg	EPA residential screening level (400 mg/kg)

a. Ecological goal is lower than human health goal of 1.27 mg/kg.

b. The maximum cesium-137 concentration at the CFA-08 drainfield (180 pCi/g) will naturally decay to 23 pCi/g in the 100-year IC period for the INEEL. However, the ultimate goal for unrestricted access is 2.3 pCi/g, the 1E-04 future residential risk-based concentration. That concentration will be achieved in an additional 89 years through continued natural decay. Note that 23 pCi/g is not a true “remediation goal” in that soil is not being removed to this level; it will be achieved through radioactive decay. Confirmatory soil sampling to demonstrate that this level is achieved in 100 years will not be performed under this remedy, because the known radioactive half-life for cesium-137 is 30 years (Benedict et al. 1981).

## **10. DESCRIPTION OF ALTERNATIVES**

The alternatives listed below were developed to meet the RAOs for contaminated materials at sites CFA-04, -08, and -10.

1. No Action (with monitoring)
2. Limited Action
3. Excavation, treatment by stabilization, and disposal
  - a. On-INEEL disposal
  - b. Off-INEEL disposal
4. Containment.

A brief description of each alternative is presented in the sections below.

### **10.1 Alternative 1—No Action (With Monitoring)**

The NCP [40 CFR 300.430(e)(6)] requires consideration of a No Action alternative to serve as a baseline for evaluation of other remedial alternatives. The primary elements of Alternative 1 are:

- No remedial actions would be taken.
- No land-use restriction, controls, or active remedial measures would be implemented at the site.
- Environmental monitoring may be warranted if contamination is left in place under this alternative. Monitoring would enable detection of contaminant migration within environmental media (air, groundwater, and soil) or other changes in site conditions that warrant future remedial actions. Monitoring would remain in effect for at least 100 years. For the sites in this ROD, environmental monitoring would consist of radiological surveys in appropriate areas, groundwater, and air monitoring. Any required air monitoring would be performed as part of the INEEL air-monitoring program. The frequency and locations of all air monitoring activities would be determined during the remedial design.

### **10.2 Alternative 2—Limited Action**

A Limited Action alternative was developed that consists of:

- Institutional controls (ICs) include property transfer restrictions in perpetuity. These restrictions would limit use of property if it is transferred from government control to private ownership. If the property is ever transferred to private ownership, the information required under Section 120(h) of CERCLA would be transferred with it. The property transfer documentation would provide notification to the new property owner disclosing former waste management and disposal activities that occurred on the site. It would limit property use to activities that would prevent human health risks from exceeding allowable levels. These restrictions may take the form of restrictive covenants or easements established in perpetuity.

- Access restrictions would be maintained during the institutional control period using fences and signs. Routine site inspections and monitoring for animal burrows, erosion, or subsidence also will be performed to assess maintenance requirements.
- Surface water would be controlled to minimize the potential for surface water accumulation at the site. This management would include inspection and maintenance of site drainage.
- Environmental monitoring may be warranted if contamination is left in place under this alternative. Monitoring would enable detection of contaminant migration within environmental media (air, groundwater, and soil) or other changes in site conditions that warrant future remedial actions. Monitoring would remain in effect for at least 100 years. For the sites in this ROD, environmental monitoring would consist of radiological surveys in appropriate areas and groundwater monitoring. Any required air monitoring would be performed as part of the INEEL air-monitoring program. The frequency and locations of all air monitoring activities would be determined during the remedial design.

### **10.3 Alternative 3—Excavation, Treatment, and Disposal**

Remedial alternatives incorporating treatment were developed to meet ARARs and EPA's preference for treatment. Treatment may be required to dispose contaminated media removed from a site. Alternatives incorporating treatment were developed to allow risk managers to determine the relative cost-effectiveness and practicability. Excavation, treatment, and disposal alternatives could be applied to any of the three remediation sites.

#### **10.3.1 Alternative 3a—Excavation, On-INEEL Treatment, and Disposal**

**CFA-04.** This alternative would consist of the actions listed below. No ICs would be required for the CFA-04 Pond after completing the remediation, providing soil exceeding the FRG is removed.

- Characterizing the site and excavating soil and sediments from the pond exceeding FRG. Soil contaminated at concentrations above the FRG will be excavated to a maximum depth of 3 m (10 ft) bgs or to basalt. No basalt will be excavated.
- Transporting excavated soil exceeding the FRG to the ICDF.
- Stabilizing soil exceeding the RCRA characteristic hazardous waste levels for mercury with cement.
- Disposing treated and nontreated soil at the ICDF.
- Performing verification sampling to ensure that there is no identified contamination remaining at the site exceeding the FRG.
- Backfilling the pond and any adjacent excavations with uncontaminated soil to grade. All excavations will be contoured to match the surrounding terrain and revegetated.

**CFA-08.** This alternative would consist of the actions listed below. No ICs are necessary at CFA-08 provided that soil exceeding the FRG is removed from the site. Note that in this instance the FRG for excavation would be 2.3 pCi/g for cesium-137; that concentration is the 1E-04 risk-based concentration for the future residential scenario for unrestricted access.

- Characterizing soil and excavating soil and sediments from the drainfield exceeding FRG. Soil contaminated at concentrations above the FRG will be excavated to a maximum depth of 3 m (10 ft) bgs or to basalt. No basalt will be excavated.
- Allowing sludges remaining in drainfield feeder lines to drain into soil during excavation.
- Transporting soil exceeding the FRG to the ICDF
- Performing verification sampling to ensure that there is no identified contamination remaining at the site exceeding the FRG.
- Returning soil contaminated at less than FRG to the excavation.
- Backfilling the excavation with uncontaminated native soil, creating final slopes that will divert water, and revegetating the site.

This alternative originally used soil separation as the treatment technology. However, a pilot-scale treatability study performed by WAG 5 in 1999 (INEEL 1999) concluded that this technology is not cost effective for this type of soil contamination. Therefore, soil separation was eliminated from the alternative. Soil excavated that exceeds the FRG would be disposed of at the ICDF.

**CFA-10.** This alternative would consist of the actions listed below. No ICs are necessary at CFA-10 provided that soil exceeding the FRG is removed from the site.

- Characterizing soil and excavating soil exceeding FRG. Soil contaminated at concentrations above the FRG will be excavated to a maximum depth of 3 m (10 ft) bgs or to basalt. No basalt will be excavated.
- Performing verification sampling to ensure that there is no identified contamination remaining at the site exceeding the FRG.
- Transporting soil contaminated above the FRG to the ICDF.
- Stabilizing soil that exhibits the RCRA toxicity characteristic for lead, and disposing of treated and nontreated soils to the ICDF.
- Returning soil contaminated at less than the FRG to the excavation.
- Backfilling the excavation with uncontaminated soil to grade. The excavation will be contoured to match the surrounding terrain and revegetated.

### **10.3.2 Alternative 3b—Excavation, Treatment, and Disposal Off-INEEL**

**CFA-04.** This alternative would consist of the actions described in Section 10.3.1, Alternative 3a, for this site, except that soils exceeding the FRG would be treated, transported to, and disposed of at an off-INEEL TSDF.

**CFA-08.** This alternative would consist of the actions listed in Section 10.3.1, Alternative 3a, for this site, except that soils contaminated at levels exceeding the FRG would be transported to an off-INEEL low-level waste landfill for disposal.

**CFA-10.** This alternative would consist of the actions described in Section 10.3.1, Alternative 3a, for this site, except that soils exceeding the FRGs would be treated, transported to, and disposed of at an off-INEEL TSDF.

## **10.4 Alternative 4—Containment and Institutional Controls**

The alternatives developed for containing contamination are based on capping technologies. These alternatives would be designed to meet RAOs by eliminating exposure pathways identified in the BRA. The cap must be designed to maintain integrity for the period of time that unacceptable exposure risks will be present. The functional life of a particular cover is dependent on how long failure mechanisms such as erosion, subsidence, geosynthetic failure, infiltration, biotic and human intrusion can be delayed. The human health risks due to cesium-137 contamination at CFA-08 will decline to acceptable levels for unrestricted access within 189 years through natural radioactive decay. Human health and ecological risks due to toxic metals at CFA-04 and -10 will not decrease due to time.

For CFA-04 and CFA-10, the cap would also be required to meet RCRA 40 CFR 264.310(a)(1-5), which would be an ARAR for those sites. This regulation specifies that the cap must meet the following functional requirements:

- Provide long-term minimization of infiltration
- Function with minimum maintenance
- Promote drainage and minimize erosion or abrasion of the cover
- Accommodate settling and subsidence so that the cover's integrity is maintained
- Maintain permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

An engineered C-ET barrier was determined to best meet the functional requirements and was selected as the representative capping technology for Alternative 4 for all three.

Institutional controls, as described for Alternative 2, would be implemented. The cap would be maintained during the entire 100-year IC period. Long-term maintenance and inspection requirements would include reestablishing vegetation as necessary, repairing any subsidence, erosion furrows and animal burrows, and removing undesirable plants. Long-term monitoring requirements would include visual inspections and radiation surveys.

## **11. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

The alternatives discussed in Section 10 were evaluated for each site using the nine evaluation criteria required under CERCLA (40 CFR 300.430[f][5][I]). The purpose of these comparisons is to identify the relative advantages and disadvantages of each alternative. Each criterion is described below and the alternatives are presented in decreasing order from the most to least advantageous. Table 11-1 provides a summary of the evaluation criteria for the alternatives and a ranking of alternatives for each criterion and each site.

### **11.1 Threshold Criteria**

The selected remedial action must meet the threshold criteria of overall protection of human health and the environment, and compliance with ARARs.

#### **11.1.1 Overall Protection of Human Health and the Environment**

This criterion addresses the degree to which a remedy provides adequate protection of human health and the environment. Risks posed by the COCs at the site may be eliminated, reduced, or controlled through removal, treatment, engineering controls, or ICs. Long-term risk calculations in the BRA and short-term health effects associated with construction work in the field must be considered for this criterion.

- Alternatives 3a and 3b are the most protective, since contaminated soil above FRGs would be removed from WAG 4.
- Alternative 4 meets human health and ecological RAOs; however, it is less effective than Alternatives 3a and 3b, since contamination would remain at the sites. Mercury and lead would remain indefinitely at CFA-04 and CFA-10, respectively, while cesium-137 at CFA-08 would decay to allowable residential levels within 189 years.
- Alternative 2 does not meet the criterion at CFA-04, CFA-08, or CFA-10. Contamination remaining at CFA-04 and CFA-10 would exceed human health remediation goals. Contamination remaining at CFA-08 after 100 years of institutional control would exceed the human health unrestricted release criterion of 2.3 pCi/g cesium-137.
- Alternative 1 does not satisfy the criterion for any of these three sites, because site access and contact with the contaminated media are not prevented, and potential risks are not reduced. The no action alternative does not meet RAOs for protection of human health and the environment.

**Table 11-1.** Relative ranking of alternatives evaluated for the three WAG 4 OU 4-13 sites of concern.<sup>a</sup>

Evaluation Criteria	CFA-08	CFA-04	CFA-10
Overall protection of human health and the environment	(3b, 3a), 4 1 and 2 do not meet the criterion.	(3a, 3b), 4 1 and 2 do not meet the criterion.	(3a, 3b), 4 1 and 2 do not meet the criterion.
Compliance with ARARs	(3a, 3b, 4) 1 and 2 do not meet the criterion.	(3a, 3b, 4) 1 and 2 do not meet the criterion.	(3a, 3b, 4) 1 and 2 do not meet the criterion.
Long-term effectiveness and permanence	(3a, 3b), 4	(3a, 3b), 4	(3a, 3b), 4
Reduction of toxicity, mobility or volume through treatment	(3a, 3b), 4	(3a, 3b), 4	(3a, 3b), 4
Short-term effectiveness	4, (3a,3b)	4, (3a, 3b)	4, (3a, 3b)
Implementability	4, 3b, 3a	4, 3b, 3a	4, 3b, 3a
Cost	4, 3a, 3b	3a, 4, 3b	3a, 3b, 4

a. Ranking is from highest to lowest, except for costs, which are ranked from lowest to highest in net present value.

( ) =No significant difference between alternatives with respect to the criterion.

Alternative 1: No Action with monitoring.

Alternative 2: Institutional Controls.

Alternative 3a: Excavate, Treat, and ICDF Disposal

Alternative 3b: Excavate, Treat and Off-INEEL TSDF Disposal

Alternative 4: Containment with an engineered cover and Institutional Controls.

### 11.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Evaluation of compliance with ARARs for all alternatives is included in Table 11 -1 and summarized below. A complete list of ARARs for selected remedies are provided in Section 13, Table 13-1.

- Alternatives 3a, 3b, and 4 meet all ARARs identified in Section 13, Table 13-1 for CFA-04, CFA-08, and CFA-10.
- The RAOs for CFA-04 and CFA-08 would be met under Alternative 4 since contaminated soil would be capped and the exposure pathway eliminated. The engineered cover could meet the to-be-considered (TBC) requirements of DOE orders for low-level waste disposal for CFA-08 and would meet RCRA Subtitle C requirements of cap performance for CFA-04 and CFA-10.

- Alternative 2 would not meet (DOE Order 5400.5) for a period of 89 years after the 100-year institutional control period at CFA-08. Because hazardous constituents would be left in place, Alternative 2 would not meet RCRA Subtitle C standards for landfill closure and post-closure at CFA-04 and CFA- 10.
- Alternative 1 would not meet (DOE Order 5400.5) for 189 years at CFA-08. Alternative 1 would not meet RCRA Subtitle C standards for landfill closure and post-closure at CFA-04 and CFA- 10.

## **11.2 Balancing Criteria**

The balancing criteria used in refining the selection of the candidate alternatives for the site include: (1) long-term effectiveness and permanence; (2) reduction in toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. Only alternatives 3a, 3b, and 4 are evaluated against balancing criteria because 1 and 2 do not fulfill the threshold criteria.

### **11.2.1 Long-Term Effectiveness and Permanence**

This criterion includes consideration of residual risk that will remain on-INEEL following remedial action. The adequacy and reliability of controls are also considered.

- Alternatives 3a and 3b would achieve the highest level of long-term effectiveness and permanence because contaminated soil and debris would be completely removed from the sites. Solid waste generated would be managed in accordance with ARARs. The ICDF will be required to meet substantive requirements for a TSDF under the Hazardous Waste Management Act and RCRA. Institutional controls would ensure effectiveness of the remedy at any site where contaminated soil above FRGs was allowed to remain below 3 in (10 ft)bgs
- Alternative 4 would be highly effective at achieving long-term effectiveness and permanence at CFA-08. The effectiveness of the containment option is greater at the CFA-08 Drainfield than at CFA-04 and CFA-10 because the cap integrity needs to be maintained for a shorter period due to the radioactive decay of the COC. External exposure risks estimated for the CFA-08 drainfield, due to cesium-137, decrease to 1E-04 in approximately 189 years. However, human health and ecological risks from toxic metals at CFA-04 and CFA-10 would not decrease with time. Under Alternative 4, long-term effectiveness and permanence at CFA-04 and CFA-10 depends on the durability of the cap. Cap integrity monitoring, as well as periodic removal of undesirable vegetation and burrowing animals (if necessary), would be performed.

### **11.2.2 Reduction of Toxicity, Mobility, or Volume Through Treatment**

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently result in reduction of toxicity, mobility, or volume of the hazardous substances as their principal elements.

- No reduction in toxicity or volume would result from stabilization (Alternative 3) of mercury- or lead-contaminated soils at CFA-04 and CFA-10, respectively. Volume increase would likely be in the range of 200%. The overall mobility of lead and mercury would be reduced through stabilization.

- No reduction in volume through treatment would occur for Alternatives 3a and 3b for site CFA-08. These alternatives, as presented in the Proposed Plan (DOE-ID 1999b), incorporated treatment by segmented gate separation (SGS) of cesium-137 contamination. Application of this treatment at WAG 4 was contingent on acceptable results in a WAG 5 treatability study that investigated the viability of SGS on INEEL soils. The results of this study indicate that the radiological components in contaminated soil could not be effectively separated (INEEL 1999). The SGS system is, therefore, not considered further for CFA-08 for either of these alternatives.
- Alternative 4 does not include treatment.

### 11.2.3 Short-Term Effectiveness

The short-term effectiveness criterion addresses the time needed to implement remedies to reduce any adverse impacts on human health and the environment. This criterion specifically refers to risks that may be posed during the construction and implementation period of remedial action prior to achieving remedial goals. For this criterion, the alternative that provides the least amount of disturbance to contaminated materials ranks the highest in terms of short-term effectiveness because of the potential for worker exposure.

- Alternatives 3a and 3b provide a moderate degree of short-term effectiveness primarily due to potential worker exposure. Health risks to workers during excavation would be minimized to the extent possible. Potential exposures from removal and treatment of waste would be mitigated using standard administrative and engineering controls. These controls could include, but are not limited to dust suppression and appropriate personal protective equipment. Other measures may include the use of excavation equipment modified with positive-pressure ventilation systems and HEPA filters for use in contaminated areas. Environmental impacts for Alternatives 3a and 3b are minimal. No environmentally sensitive archaeological or historical sites, wetlands, or critical habitat exist at WAG 4.
- Alternative 4 also provides a moderate degree of short-term effectiveness primarily due to potential worker exposure. The possibility of direct radiation exposure of workers installing a protective cover at CFA-08 would be minimized by first placing a foundation layer over the contaminated soils. Emplacement of foundation material and the lowermost layer(s) of the cover would add additional shielding sufficient to eliminate subsequent exposure risks throughout the remainder of construction activities at CFA-08. Construction activities would be performed in accordance with the as low as reasonably achievable (ALARA) approach to radiation protection as required under (10 CFR 835). Inhalation and ingestion risks due to toxic metals in soil at CFA-04 and -10 would be minimized by the use of appropriate personal protective equipment, engineering controls, and adherence to health and safety protocols. Environmental impacts resulting from excavation and construction activities would be minimal.

### 11.2.4 Implementability

The implementability criterion addresses such factors as the availability of services and materials. Coordination with other governmental entities is also considered.

- The implementability of Alternative 3a for CFA-04, CFA-08, and CFA-10 is considered moderate. The technology to perform stabilization is readily implementable. Chemical

stabilization of lead and mercury has been previously performed at the INEEL. The moderate rating is primarily due to the uncertain availability of the ICDF, which is planned to begin operations in 2004.

- The implementability of Alternative 3b for site CFA-04 and -10 is considered high, due to the ready availability of an off-INEEL disposal facility. The technology associated with stabilization and disposal is also readily implementable. Off-INEEL disposal can be implemented sooner because the ICDF may not be complete for several years. The implementability of Alternative 3b for CFA-08 is high.
- Alternative 4 is highly implementable for all three sites due to the availability of materials and technology.

### **11.2.5 Cost**

Table 11-2 presents a summary of the comparative costs of the alternatives for CFA-04, CFA-08, and CFA- 10.

**CFA-04.** Of the three alternatives that meet the threshold criteria, the least costly alternative for CFA-04 is Alternative 3a, Excavation, Treatment and disposal at ICDF. Alternative 4 is the next lowest cost. The operating and maintenance costs for Alternative 4 account for approximately 40% of the overall costs. Alternative 3b has the highest cost, primarily due to the cost of shipping contaminated soils to an off-INEEL facility.

**CFA-08.** Of the three alternatives that meet the threshold criteria, the least costly alternative for CFA-08 is Alternative 4, Containment. Approximately 35% of this total cost is attributable to operating and maintenance costs. Alternative 3a has the next lowest cost. The increase in costs for 3a is due to the excavation of drainfield soils and on-INEEL disposal. The costs for Alternative 3b are highest due to the additional cost of off-INEEL transport and disposal.

**CFA-10.** Of the three alternatives that meet the threshold criteria, the least costly alternative for CFA-10 is Alternative 3a, Excavate, Treat, and disposal at the ICDF. Alternative 3b has the next lowest cost. The slightly higher cost of Alternative 3b in comparison to 3a is primarily due to the additional cost of off-INEEL transport and disposal. Alternative 4, containment, has the highest cost. Approximately 55% of these costs are attributed to long-term operations and maintenance of a cover.

## **11.3 Modifying Criteria**

The modifying criteria—state and community acceptance—are used in the final evaluation of remedial alternatives. Consideration in evaluating state and community acceptance includes elements of the alternatives that are supported, unsupported, or strongly opposed.

### **11.3.1 State Acceptance**

The IDHW has been involved in the development and review of the RI/FS report, the Proposed Plan, and this ROD. All comments received from IDHW have been resolved and incorporated into these documents. The IDHW has participated in public meetings where public comments and concerns have been voiced and responses offered.

The IDHW concurs with the selected remedial alternatives.

**Table 11-2.** Costs for the alternatives considered for CFA-04, CFA-08, and CFA- 10.

	Alternative 1 No Action	Alternative 3a on-INEEL	Alternative 3b off-INEEL	Alternative 4 containment
CFA-04				
Capital cost	\$0.9	\$4.8	\$12.6	\$4.8
O & M	<u>0.2</u>	<u>N/A</u>	<u>0.2</u>	<u>3.1</u>
Total cost	\$1.1	\$4.8*	\$12.8	\$7.9
CFA-08				
Capital cost	\$0..9	\$30.8	\$36.5	\$7.3
O & M cost	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>\$3.5</u>
Total cost	\$1.1	\$31.0	\$36.7	\$10.8
CFA-10				
Capital cost	\$0.8	\$1.3	\$1.4	\$2.1
O & M cost	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>2.7</u>
Total Cost	\$0.8	\$1.3	\$1.4	\$4.8

Costs are in millions and net present value.

O&M costs are included in capital costs for CFA-10 alternatives 1, 3a and 3b.

N/A=Not Applicable

\* These costs are lower than the \$6.9M estimate presented in the Proposed Plan because the number of five-year reviews was reduced by one and ICDF disposal costs to be borne by WAG 3 have been removed (DOE-ID 2000d).

### 11.3.2 Community Acceptance

Community participation in the remedy selection process includes participation in the public meetings held in August, 1999, and review of the Proposed Plan during the public comment period that began August 5 and ended October 4, 1999. The highlights of community participation are included in Section 3. The Responsiveness Summary (Part III) includes verbal and written comments received from the public and the Agencies' responses to these comments.

Approximately 30 people not associated with the project attended the proposed plan public meetings. Overall, 12 people provided formal comments; of these, five people provided verbal comments, and seven provided written comments. All comments received on the Proposed Plan were considered during the development of this ROD.

In general, the public was supportive of the preferred alternatives for the three sites to be remediated at WAG 4. Two stakeholders questioned the need for cleanup and the cost estimates for the remedial projects. It was explained that the sites were selected on the basis of CERCLA cleanup criteria, and that costs will be refined as the projects progress through the RD/RA process. Please refer to the Responsiveness Summary in Part III for more details.

## 12. SELECTED REMEDY

### 12.1 Description of Selected Remedy

#### 12.1.1 CFA-04 Pond (OU 4-05)

**12.1.1.1 Selected Remedy.** The Agencies have selected Alternative 3a, Excavation, Treatment by Stabilization, and on-INEEL Disposal for the CFA-04 Pond mercury-contaminated soil. The selected alternative most cost-effectively meets the threshold and balancing criteria of the three alternatives considered. Under this alternative, approximately 6,338 M<sup>3</sup> (8,290 yd<sup>3</sup>) of contaminated soil will be excavated. Soil with concentrations above the RCRA characteristic hazardous waste levels (estimated as 608 m<sup>3</sup> [796 yd<sup>3</sup>]) will be stabilized with cement to comply with 40 CFR 268.49. The pond and adjacent excavations will be backfilled with clean soil to grade. The ground surface will be contoured to match the surrounding terrain or sloped to promote drainage and revegetated.

This remedy will consist of the following actions:

1. Characterizing the site and excavating soil from CFA-04 that exceeds the mercury FRG of 0.50 mg/kg. Soil contaminated at concentrations above the FRG will be excavated to 10 ft. (bgs), or to basalt. No basalt will be excavated.
2. Transporting and disposing of soil that exceed the mercury FRG to the proposed ICDF.
3. Stabilizing soil with TCLP mercury concentrations greater than 0.2 mg/L using cement and verification that all LDRs are met.
4. Performing verification sampling to ensure that soil exceeding the FRG of 0.50 mg/kg mercury has been removed.
5. Backfilling the pond, and adjacent areas that have been excavated, with uncontaminated soil to grade or sloped to promote drainage. All excavations will be contoured to match the surrounding terrain and revegetated.

Long-term institutional controls are not anticipated for the CFA-04 Pond, but will be evaluated after remediation.

**12.1.1.2 Evaluation.** Alternative 3a will protect human health and the environment and will comply with ARARs. This alternative will be highly effective long-term because it removes the contamination. It will only be moderately effective short-term because of the possibility of worker exposure during excavation, transport, and disposal. Alternative 3a will not reduce toxicity or volume through treatment, but will reduce contaminant mobility through stabilization. Implementability of Alternative 3a is moderate, because availability of the disposal facility on the INEEL is uncertain.

Compared to the other alternatives that meet the threshold criteria (3b and 4), Alternative 3a will be as or more effective long-term, and equally effective short-term. Its ranking for reduction of toxicity, mobility, or volume through treatment is the same or better. Its implementability is lower than for Alternatives 3b and 4, given the uncertain availability of the on-INEEL disposal facility; however, all other required technologies and personnel are available. The estimated \$4.8 million cost is the lowest of the three alternatives that meet threshold criteria. Therefore, this alternative 3a is the selected remedy.

**12.1.1.3 Performance Standards.** Performance standards will be implemented to ensure that excavation, treatment, and disposal activities will result in protection against direct exposure to mercury during excavation and after disposal. The performance standards identified for this alternative include:

- Removing mercury contaminated soil where concentrations exceeding the FRG (0.5 mg/kg) are detected.
- Sampling soil at the pond to confirm that the cleanup meets or exceeds FRGs.
- Sampling of contaminated soil removed from the pond to confirm that soil disposed to the ICDF meets treatment standards for mercury and all underlying hazardous constituents (40 CFR 268.48). It must also meet the waste acceptance criteria of the ICDF. Soil meeting this standard must be less than 0.2 mg/L using TCLP analysis. Contaminated soil that does not meet treatment standards and requires treatment will be treated prior to disposal.

### **12.1.2 CFA-08 Sewage Plant Drainfield (OU 4-08)**

**12.12.1 Selected Remedy.** The Agencies have selected Alternative 4, Containment, for the CFA-08 SP Drainfield. The selected alternative most cost-effectively meets the threshold and balancing criteria, of the three alternatives considered. Under this alternative, the contaminated site will be covered with an engineered protective cover. This cover will be an engineered barrier, constructed of layers of rock and soil with a vegetative cover. This barrier will isolate the waste and minimize water infiltration. The cover will be designed to isolate the low-level radioactive contaminants from human and biotic intrusion and to provide radiation shielding for a period of 189 years. The following remedial actions will be performed at the site:

1. Constructing an engineered ET cover. Clean native soil will be used for fill material as needed.
2. Contouring and grading the surrounding terrain to direct the surface water runoff away from the cover.

The continued effectiveness of this remedy will be evaluated through soil cover integrity monitoring and above-ground radiological surveys. Because contamination is to be left in place, ICs are necessary for CFA-08 to restrict access until the land can be released for unrestricted use. Institutional controls to be implemented at CFA-08 include:

- Restricting access through the use of signs and permanent markers
- Controlling land use leasing and property transfers
- Establishing and publishing surveyed boundaries
- Controlling activities on the land.

**12.1.2.2 Evaluation.** Alternative 4 was selected for CFA-08 because it is protective of human health and the environment and complies with ARARs. It will have high long-term effectiveness because it will eliminate the direct exposure pathway and contain the contamination until the risks to human health posed by the cesium-137 drop below threshold levels. In addition, it will eliminate the ecological risk exposure pathway to the mercury. Short-term effectiveness will be moderate due to the possibility for worker

exposure during construction. This alternative will not reduce toxicity, mobility, or volume through treatment. Implementability of Alternative 4 is high, because the technology, personnel, and materials are readily available. Institutional Controls are required for the selected option.

Compared to the other alternatives that meet the threshold criteria (3 a and 3b), Alternative 4 will have the same or greater long-term effectiveness and implementability. Its short-term effectiveness is greater than that for Alternatives 3a and 3b because of reduced worker exposure to site risks. Its ranking for reduction of toxicity, mobility, or volume through treatment is the same as for Alternative 2, and is lower than Alternatives 3a and 3b, because Alternative 4 involves no treatment. The estimated \$9.9 million cost is significantly lower than for Alternatives 3a and 3b. Therefore Alternative 4 is the selected remedy.

**12.1.2.3 Performance Standards.** The performance standards identified for Alternative 4 include the following design requirements for the cover:

- Develop and implement surface monitoring and maintenance programs to detect cesium-137 and contain it within the site boundary.
- Institute restrictions limiting land use/access for at least 189 years. Institutional controls will be maintained and transferred, as applicable, until cesium- 137 has decayed to an acceptable risk level.
- Implement surface water controls to direct surface water away from the capped drainfield.
- Eliminate, to the extent practicable, the need for ongoing active maintenance following construction so that only surveillance, monitoring, and minor custodial care are required.
- Design and construct an adequate cover to inhibit erosion by natural processes for the specified design life of the cover.
- Incorporate features that will inhibit biotic intrusion into the contaminated drainfield.

### **12.1.3 CFA-10 Transformer Yard (OU 4-09)**

**12.1.3.1 Selected Remedy.** The Agencies have selected Alternative 3b, Excavation, Treatment by Stabilization, and Off-INEEL Disposal for CFA-10 Transformer Yard. The selected alternative most cost-effectively meets the threshold and balancing criteria of the three alternatives considered. Under this alternative, the contaminated soil (approximately 122 m<sup>3</sup> [160 yd<sup>3</sup>]) will be excavated. The soil will be transported to an off-Site disposal facility and soil requiring treatment per 40 CFR 268.49 will be stabilized before disposal; soil not requiring treatment will be disposed of directly. The excavation will be backfilled with clean soil, contoured to match the surrounding terrain, sloped to divert water, and revegetated.

This remedy will consist of the following actions:

1. Characterizing the site and excavating soil from CFA-10 that exceeds the lead FRG of 400 mg/kg
2. Performing verification sampling in the excavated yard to ensure that soil exceeding the FRG of 400 mg/kg for lead has been removed

3. Stabilizing, with cement, soils with lead concentrations above the RCRA characteristic hazardous waste level of 5 mg/L, if any, and sampling stabilized soil to meet LDRs
4. Transporting and disposing of excavated and stabilized soil to a permitted off-INEEL TSDF
5. Backfilling areas that have been excavated with uncontaminated soil to grade or sloping it to promote drainage. All excavations will be contoured to match the surrounding terrain and revegetated.

No long-term ICs are anticipated for the CFA-10 Transformer Yard site, but they will be evaluated after remedial action.

**12.1.3.2 Evaluation.** At the CFA-10 site, Alternative 3b is protective of human health and the environment, and complies with ARARs. The alternative will have high long-term effectiveness because it will remove the contamination from the INEEL. Its short-term effectiveness will be moderate, because of the possibility for worker exposure during excavation, transport, and disposal activities. Alternative 3b will not reduce toxicity through treatment, but will reduce mobility through stabilization. The treatment with cement will increase volume. Implementability of this alternative is high, because the technology, off-INEEL disposal facility, and personnel are readily available.

Compared to the other alternatives that meet the threshold criteria (3a and 4), Alternative 3b will have the same or greater long-term effectiveness and the same short-term effectiveness. It ranks the same or better compared with the other alternatives for reduction of toxicity, mobility, or volume through treatment. The implementability of Alternative 3b is greater than other alternatives. The estimated \$1.4 million cost is slightly more than for Alternative 3a but substantially lower than for Alternative 4. Alternative 3b, is relatively equal in all other respects and was selected by the Agencies because it can be implemented more rapidly than Alternatives 3a or 4.

**12.1.3.3 Performance Standards.** Performance standards will be implemented to ensure that excavation, treatment, and disposal activities will result in protection against direct exposure to lead during excavation and after disposal. The performance standards identified for this alternative include:

- Removing lead contaminated soil where concentrations exceeding the FRGs (400 mg/kg) are detected. Sampling of the stabilized soil to confirm that soil disposed meets treatment standards for lead and all underlying hazardous constituents.
- Sampling the transformer yard soil to confirm that the cleanup meets or exceeds FRGs.

## 12.2 Institutional Controls

Institutional controls or land use restrictions will be maintained by DOE at any INEEL CERCLA site where residual contamination precludes unrestricted land use per EPA Region 10 Policy (EPA 1999a). A site is considered available for unrestricted land use if potential risks to a current resident are less than  $1\text{E-}04$ . ICs may be discontinued if contaminant conditions or potential risk levels change; if these situations occur, they will be documented during CERCLA five-year reviews.

In accordance with CFLUP (DOE-ID 1996), DOE will provide ICs for sites subject to land-use restrictions over the next 100 years unless a CERCLA five-year review concludes that unrestricted land use is allowable. After 100 years, DOE may no longer manage INEEL activities but controls will remain in place in the form of land-use restrictions. The Hall Amendment of the National Defense Authorization

Act of 1994 (Public Law 103-160) requires concurrence from EPA on the lease of any site on the National Priorities List (NPL) during the period of DOE-ID control. CERCLA (42 USC 9620 § 120[h]) requires that the state be notified of a lease involving a site, where contaminants may be present. DOE-ID is also required under CERCLA (42 USC 9620 § 120[h]) to indicate the presence of contamination and any restrictions at the time of property transfer.

Table 12-1 summarizes the IC evaluation for all sites at WAG 4. Long-term ICs are planned for four sites that include the CFA-08 SP Drainfield and the CFA I, II, and III Landfills (OU 4-12). The Drainfield will require ICs because of the residual risk from cesium-137 that will remain at the site for approximately 189 years. ICs were identified as part of the selected remedy for the Landfills in the OU 4-12 ROD to ensure that future activities would not compromise the integrity of the covers (DOE-ID 1995). A description of ICs that will be applied for these sites is provided in Table 12-2 and the estimated costs for ICs at CFA-0.8 are included in Table 12-3.

Additional ICs are not planned for CFA-04 Pond and CFA-10 Transformer Yard prior to remediation since there is only a residential use concern and INEEL has adequate land use controls in place to prevent residential use during current DOE operations. Also these sites are being permanently fenced with locked gates and require the approval of the ER WAG 4 Manager and the CFA Site Area Director to enter. Any soil disturbance would require a Soil Disturbance Notification which requires Agency approval. One of the 47 no action sites at WAG 4 also requires ICs. The CFA-07 French Drain has residual lead contamination above the 400 mg/kg screening level below 10 ft.

A comprehensive approach for establishing, implementing, enforcing, and monitoring institutional controls will be developed in accordance with Environmental Protection Agency (EPA) "Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities" (EPA 1999b). The following elements for WAG 4 institutional controls will be developed in the operation and maintenance (O&M) plan and will involve a facility-wide land use plan and procedures for controlling activities as outlined in the policy:

- A comprehensive facility-wide list of all WAG 4 areas or locations covered by any and all decision documents at the facility that have or should have institutional controls for protection of human health or the environment. The information on this list will include, at a minimum, the location of the area, the objectives of the restriction or control, the timeframe that the restrictions apply, and the tools and procedures that the facility will use to implement the restrictions or controls and to evaluate the effectiveness of the restrictions or controls.
- Cover, and legally bind where appropriate, all entities and persons, including, but not limited to, employees, contractors, lessees, agents, licensees, and invitees. In areas where the facility is aware of routine trespassing, trespassers will be covered.
- Cover all activities and reasonably anticipated future activities, including, but not limited to, any future soil disturbance, routine and nonroutine utility work, well placement and drilling, recreational activities, groundwater withdrawals, paving, training activities, construction, renovation work on structures or other activities.
- A tracking mechanism that identifies all land areas under restriction or control.

- A process to promptly notify both EPA and the State prior to any anticipated change in land use designation, restriction, land users, or activity for any institutional control required by a decision document.

Within 6 months of signature of this ROD, a monitoring report on the status of institutional controls at WAG 4 will be submitted to the EPA and Idaho Department of Health and Welfare. An updated institutional control monitoring report will be submitted to the EPA and Idaho Department of Health and Welfare at least annually thereafter. After the facility's comprehensive facility-wide approach is well established and the facility has demonstrated its effectiveness, the frequency of future monitoring reports may be modified subject to approval by EPA and the State. The institutional control monitoring report will contain at a minimum:

- A description of how DOE is meeting the facility-wide institutional control requirements
- A description of how DOE is meeting the WAG 4 specific objectives, including results of visual field inspections of all areas subject to WAG 4 specific restrictions
- An evaluation of whether or not all the WAG specific and facility-wide institutional control requirements are being met
- A description of any deficiencies and the efforts or measures that have been or will be taken to correct problems.

EPA and State review of the institutional control monitoring report will follow existing procedures for agency review of documents.

The DOE will notify EPA and the State immediately upon discovery of any activity that is inconsistent with the WAG specific institutional control objectives, or of any change in the land use or land use designation of a site addressed in the WAG 4 list of areas or locations covered by institutional controls. DOE will work together with EPA and the State to determine a plan of action to rectify the situation except in the case where DOE believes the activity creates an emergency situation, the DOE can respond to the emergency immediately upon notification to EPA and the State and need not wait for EPA or State input to determine a plan of action. DOE will identify a point of contact for implementing, maintaining, and monitoring institutional controls. DOE will also identify what went wrong with the institutional control process, evaluate how to correct the process to avoid future problems, and implement these changes after consulting with EPA and the State.

DOE will notify EPA and the State at least 6 months prior to any transfer, sale or lease of any property subject to institutional controls required by an EPA decision document so that EPA and the State can be involved in discussions to ensure that appropriate provisions are included in the conveyance documents to maintain effective institutional controls. DOE will not delete or terminate any institutional control unless EPA and the State have concurred in the deletion or termination. If it is not possible for DOE to notify EPA and the State at least 6 months prior to any transfer, sale or lease, then DOE will notify EPA and the State as soon as possible but no later than 60 days prior to the transfer, sale, or lease of any property subject to institutional controls.

### **12.3 Estimated Costs for the Selected Remedies**

A summary of the estimated costs for each of the selected remedies for CFA-04, CFA-08 and CFA-10 is presented in Table 12-3. All initial and future life-cycle costs are normalized to net present

value (NPV). The NPV is the cumulative worth of all costs, as of the beginning of the first year of activities, accounting for inflation of future costs. All NPV costs were estimated assuming variable annual inflation factors for the first 10 years, per DOE guidance and cost estimating procedures. A constant 5% discount rate is assumed. An O&M period of 100 years was assumed, consistent with the assumed 100 year institutional control period. The estimates were prepared to meet the accuracy range of +50% to -30% required by CERCLA.

It should be noted that the costs presented in Table 12-2 for CFA-04 differ from the costs presented in the OU 4-13 RI/FS and the Proposed Plan. The revised cost estimate is \$4.8 million NPV versus the previous estimate of \$6.9 million NPV. The cost estimate is lower because the five-year review costs have been reduced and ICDF disposal costs that will be borne by WAG 3 have been eliminated. These modifications are documented in (DOE-ID 2000d).

**Table 12-1.** Institutional control evaluation for WAG 4 sites.

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
<b>Evaluations of sites that have had or will have remedial actions.</b>					
CFA-01	Landfill I	OU 4-12 RI/FS	Yes	Landfill waste was left in place after remediation under the OU 4-12 ROD. Risks for all exposure pathways are less than 1E-04. A groundwater monitoring plan for the remaining 26 years out of 30 years is in place.	Maintain land use controls and re-evaluate at the five-year review.
CFA-02	Landfill II				
CFA-03	Landfill III				
CFA-04	Pond	OU 4-05 Track 2 OU4-13 RI/FS	No	Future 100-year residential hazard index of 80 which will be remediated per this ROD.	None
CFA-08	Sewage Plant Drainfield	OU 4-08 Track 2 OU 4-13 RI/FS	Yes	Current occupational risk is 2E-03. Future 100-year residential risk is 4E-04. Contaminated soil will be left in place after implementation of the remediation prescribed in the ROD.	Maintain land use controls for 189 years to inhibit intrusion into the buried waste. Restrict residential land use until risk is less than 1E-04 (2.3 pCi/g cesium-137) or the released based on the results of a five-year review.
CFA-10	Transformer Yard	OU 4-03 Track 2 OU 4-13 RI/FS	No	Lead concentration in excess of the EPA residential screening level of 400 mg/kg will be remediated per this ROD.	None
<b>Evaluation of no action and no further action sites.</b>					
CFA-05	Motor Pool Pond	OU 4-11 ROD OU 4-13 RI/FS	No	All human health risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-11 ROD, was further evaluated and determined to be a no action site in the OU 4-13 RI/FS.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-06	Lead Shop (outside areas)	OU 4-06 Track 2, Time Critical Removal Action OU 4-13 RI/FS	No	Lead and arsenic contaminated soil removed. Lead concentrations are below the 400 mg/kg screening level. Arsenic slightly above background, is naturally occurring. No quantifiable risk or hazard was evident after removal action. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-07	French Drains E/S (CFA-633)	OU 4-07 Track 2 Non-time critical removal action OU4-13 RI/FS	Yes	French drains were removed. Total Risk is less than 1E-06. Total hazard index is less than 1 for contaminants between the surface and 3 m (10 ft) below grade. Suspected lead concentrations above 400 mg/kg and radionuclides at depths greater than 4 m (13 ft). This site is recommended as a no further action site per this ROD.	Limit land use at depths greater than 3 m (10 ft) until otherwise evaluated and documented in a five-year review.
CFA-08	Sewage Treatment Plant	OU 4-08 Track 2 OU 4-13 RI/FS	No	All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
	Pipeline	OU 4-08 Track 2 OU 4-13 RI/FS	No	No COCs. No quantifiable risk or hazard.	None
CFA-09	Central Gravel Pit	OU 10-05 Interim Action ROD	No	Using geophysical techniques a suspected ordnance shell was not located. No quantifiable risk or hazard was indicated. This site was determined to be a no action site in OU 10 -05 Interim Action ROD.	NA

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-11	French Drain	OU 10-05 Interim Action ROD	No	Using geophysical techniques a suspected ordnance shell was not located. No quantifiable risk or hazard. This site was determined to be a no action site during the OU 10-05 Interim Action ROD.	None
CFA-12	French Drains (2) (CFA-690)	OU 4-07 Track 2 Time-critical Removal Action OU 4-13 RI/FS	No	The dry wells were removed. Contamination removed to basalt. All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action in the OU 4-13 RI/FS.	None
CFA-13	Dry Well (south of CFA-640)	OU 4-02 Track 1 Non-time Critical Removal Action OU 4-13 RI/FS	No	The dry well was removed. Total risk is less than 1E-06 for and current and future resident, after elimination of naturally occurring Ra-226 and arsenic. Total hazard index is less than 1 for current and future resident. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-14	Two Dry Wells	OU 4-02 Track 1	No	Dry wells were never found after demolition of Building CFA-665 in 1998. Original building plans indicate they would have received rainwater from roof drains. No quantifiable risk or hazard was found at this site. This site was eliminated as a no action site from the OU 4-13 RI/FS.	None
CFA-15	Dry Well (CFA-674)	OU 4-02 Track 1 Non time Critical Removal Action OU 4-13 RI/FS.	No	The drywell was removed. Risk is less than 1E-06 for current and future resident after elimination of naturally occurring Ra-226. This site was determined to be a no action site in the OU 4-13 RI/FS.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-16	Dry Well (south of CFA-682 pumphouse)	OU 4-02 Track 1	No	The drywell was left in place. No quantifiable risk or hazard to residential receptor was identified. This site was eliminated as a no action site in the OU 4-13 RI/FS.	None
CFA-17	Fire Department Training Area, bermed	OU 4-05 Track 2 Non-time Critical Removal Action OU 4-13 RI/FS	No	Contaminated soil removed. All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-18	Fire Department Training Area, Oil Storage Tanks	OU 4-03 Track 1	No	The tank was removed with no evidence of leakage. No quantifiable risk or hazard. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-19	Gasoline Tanks (2) East of CFA- 606	OU 4-02 Track 1 OU 4-03/-12 ROD	No	The former tank location was investigated with ground penetrating radar; tanks were not located. No quantifiable risk or hazard was found at this site. This site was determined to be a no action site in the OU 4-03/-12 ROD and was not further evaluated in this ROD.	None
CFA-20	Fuel Oil Tank at CFA-609 (CFA-732)	OU 4-02 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No quantifiable risk or hazard was found at this site. This site was determined to be a no action site in the OU 4-03/12 ROD.	None
CFA-21	Fuel Tank at Nevada Circle 1 (South by CFA-629)	OU 4-02 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/12 ROD and was not further evaluated in this ROD.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-22	Fuel Oil at CFA-640	OU 4-03 Track 2	No	The tank was removed. Contaminants in remaining soil were analyzed and evaluated to have a risk less than 1E-06 and a hazard index less than 1. This site was eliminated as a no action site in the OU 4-13 RI/FS.	None
CFA-23	Fuel Oil Tank at CFA-641	OU 4-03 Track 1	No	The tank was removed. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-24	Fuel Oil Tank at Nevada Circle 2 (South by CFA-629)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No holes or signs of leakage were observed. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-25	Fuel Oil Tank at CFA-656 (North Side)	OU 4-02 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage observed. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-26	CFA-760 Pump Station Fuel Spill	OU 4-09 Track 2	No	The tank was removed. All risks due to soil exposure are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-27	Fuel Oil Tank at CFA-669 (CFA-740)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. Contaminated soil was removed. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-28	Fuel Oil Tank at CFA-674 (West)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage was found. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-29	Waste Oil Tank at CFA-664	OU 4-03 Track 2 OU 4-03/-12 ROD	No	The tank was removed. Contaminated soil was removed. No contaminants were detected that exceed risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-30	Waste Oil Tank at CFA-665, active	OU 4-03 Track 2 OU 4-03/-12 ROD	No	The tank was removed. Contaminated soil was removed. No contaminants were detected that exceed 1E-06 risk-based concentrations. No active quantifiable risk or hazard was found. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-31	Waste Oil Tank at CFA-754, active	OU 4-03 Track 1	No	The tank was removed. Contaminated soil was removed. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03 /-12 ROD.	None
CFA-32	Fuel Oil Tank CFA-667 (North Side)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage was found. No contaminants were detected. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-33	Fuel Tank at CFA-667 (South Side)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. Contaminated soil near filling post was removed. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls		Description of Institutional Controls
			(Yes/No)	Basis for No Action or Institutional Controls	
CFA-34	Diesel Tank at CFA-674 (South)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. Contaminated soil was removed. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-35	Sulfuric Acid Tank at CFA-674 (West Side)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage was found. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-36	Gasoline Tank at CFA-680	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage was found. No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-37	Diesel Tank at CFA-681 (South Side)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No evidence of leakage was found. No contaminants were detected that exceed 1E-06 risk-based concentrations. No quantifiable risk or hazard. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-38	Fuel Oil Tank, CFA-683	OU 4-04 Track 1 OU 4-03/-12 ROD	No	The tank was removed. No contaminants were detected that exceed is less than risk-based concentrations. This site was determined to be a no action site in the OU 4-03/-12 ROD.	None
CFA-39	Drum Dock (CFA-771)	OU 4-03 Track 1 OU 4-03/-12 ROD	No	No source-term. This site was determined to be a no action site in the OU 4-04 Track 1.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls	Basis for No Action or Institutional Controls	Description of Institutional Controls
			(Yes/No)		
CFA-40	Returnable Drum Storage-South of CFA-601	OU 4-04 Track 1	No	No quantifiable risk or hazard was found. This site was determined to be a no action site in the OU 4-04 Track 1.	None
CFA-41	Excess Drum Storage — south of CFA-674	OU 4-04 Track 1	No	No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was determined to be a no action site in the OU 4-04 Track 1.	None
CFA-42	Tank Farm Pump Station Fuel Spills	OU 4-09 Track 2, Non-time Critical Removal Action OU 4-13 RI/FS	No	Petroleum contaminated soil was removed. All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-43	Lead Storage Area	OU 4-06 Track 2, Time Critical Removal Action OU 4-13 RI/FS	No	Lead and antimony contaminated soil was removed. Lead and antimony concentrations are less than 400 mg/kg screening level and risk- based concentration of 31, respectively. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-44	Spray Paint Booth Drain	OU 4-06 Track 2, Time Critical Removal Action OU 4-13 RI/FS	No	Lead concentrations are less than 400 mg/kg screening level. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-45	Underground Storage Tank	OU 4-03 Track 2	No	No contaminants were detected that exceed 1E-06 risk-based concentrations. This site was eliminated as a no action site in the OU 4-13 RI/FS.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-46	Cafeteria Oil Tank Spill (CFA-721)	OU 4-09 Track 2 OU 4-13 RI/FS	No	All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-47	Fire Station Chemical Disposal	OU 4-05 Track 2, Non-time Critical Removal Action OU 4-13 RI/FS	No	Petroleum contaminated soil removed. Lead concentrations are less than 400 mg/kg screening level. Total risk is less than 1E-06 for current and future resident. Total hazard index is less than 1 for current and future resident. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-48	Chemical Washout South of CFA-633	OU 4-07 Track 2	No	No COCs identified, however mercury was detected. Total risk is N/A. Total hazard index is less than 1 for current and future resident. This site was eliminated as a no action site in the OU 4-13 RI/FS.	None
CFA-49 (Part of CFA-08 SP)	Hot Laundry Drain Pipe	OU 4-08 Track 2, OU 4-13 RI/FS	No	No COCs identified. All risks are less than 1E-06 and the hazard index is less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None
CFA-50	Shallow Well East of CFA-654	OU 4-05 Track 2,	No	No COCs identified. Lead concentrations are less than 400 mg/kg. Risk - Not quantifiable, Total HI is less than 1. This site was eliminated as a no action site in the OU 4-13 RI/FS.	None
CFA-51	Drywell at North End of CFA-640	OU 4-13 RI/FS	No	No COCs identified. Lead concentrations are less than 400 mg/kg. This site was determined to be a no action site in the OU 4-13 RI/FS.	None

**Table 12-1. (continued).**

Site Code	Site Name	FFA/CO Classification	Institutional controls (Yes/No)	Basis for No Action or Institutional Controls	Description of Institutional Controls
CFA-52	Diesel Fuel UST (CFA-730) at Bldg CFA-613 Bunkhouse	OU 4-13 RI/FS	No	All risks are less than 1E-06 and the hazard index less than 1. This site was determined to be a no action site in the OU 4-13 RI/FS.	None

**Table 12-1.** Institutional control requirements for WAG 4 Remediated sites.

Timeframe	Land Restriction <sup>a</sup>	Exposure Concern	Objective	Controls	Regulatory Basis or Authority
<b>Site CFA-01, CFA-02, CFA-03 Landfills I, II and III, respectively, (OU 4-12). Cumulative risk is less than 1E-04 for future resident. Covers emplaced as presumptive remedies.</b>					
Current DOE operations	Landfill— no unauthorized intrusion into capped area	Buried waste including asbestos	Maintain integrity of soil cover	<ol style="list-style-type: none"> <li>1. Visible access restrictions (warning signs and permanent markers)</li> <li>2. Control of activities (drilling or excavating and drilling of residential drinking water wells)</li> <li>3. Publication of surveyed boundaries and descriptions of controls in the INEEL Land Use Plan (DOE-ID 1996)</li> </ol>	<p>Federal Facility Agreement and Consent Order (DOE-ID 1991)</p> <p>National Oil and Hazardous Substances Pollution Control Plan (40 CFR Part 300)</p> <p>CERLA [42 USC 9620 § 120(h)]</p>
DOE control post operations (i.e., after operations cease)	Landfill— no unauthorized intrusion into capped area	Buried waste including asbestos	Maintain integrity of soil cover	<ol style="list-style-type: none"> <li>1. Visible access restrictions (warning signs)</li> <li>2. Control of activities (drilling or excavating)</li> <li>3. Property lease requirements including control of land use consistent with this ROD</li> <li>4. Notice to affected stakeholders (e.g., Bureau of Land Management, Sho-Ban Tribal Council, local county governments, IDHW, and EPA) for any change in land-use designation, restriction, or land users</li> </ol>	<p>Federal Facility Agreement and Consent Order (DOE-ID 1991)</p> <p>CERCLA [42 USC 9620 § 120(h)(5)]<sup>b</sup></p> <p>Hall Amendment of the National Defense Authorization Act<sup>c</sup> (Public Law 103-160)</p> <p>Property release restrictions (DOE Order 5400.5)</p>

**Table 12-1.** (continued)

Timeframe	Land Restriction <sup>a</sup>	Exposure Concern	Objective	Controls	Regulatory Basis or Authority
Post DOE control	Landfill— no unauthorized intrusion into capped area	Buried waste including asbestos	Maintain integrity of soil cover	Property transfer requirements including issuance of a finding of suitability to transfer and control of land use consistent with this ROD.	FFA/CO (DOE-ID 1991) CERLA [42 USC 9620 § 120(h)(3)] <sup>d</sup> CERCLA [42 USC 9620 § 120(h)(3)(C)(ii)] <sup>c</sup> CERCLA [42 USC 9620 § 120(h)(3)(A)(iii)] <sup>f</sup> CERCLA [42 USC 9620 § 120(h)(1)-(3)] <sup>g</sup> CERCLA [42 USC 9620 § 120(h)(4)] <sup>h</sup> Property relinquishment notification (43 CFR Criteria for Bureau of Land Management Excess property reporting requirements Property release restrictions (DOE Order 5400.5)
<b>CFA-08 Sewage Plant Drainfield.</b> Subsurface radiological contamination to be remediated by capping in accordance with this ROD. Contaminant of Concern cesium-137					
Current DOE operations— prior to remediation	Industrial	Radionuclides—external radiation	Prevent exposure to contaminated soil, except for approved activities pursuant to the FFA/CO	1. Visible access restrictions (radioactivity barriers) 2. Control of activities (drilling or excavating)	FFA/CO (DOE-ID 1991) Worker protection (10 CFR 835) National Oil and Hazardous Substances Pollution Control Plan (40 CFR Part 300) CERCLA [42 USC 9620 § 120(h)] Radiation protection of the public and ALARA principles (DOE Order 5400.5)

**Table 12-1.** (continued).

Timeframe	Land Restriction <sup>a</sup>	Exposure Concern	Objective	Controls	Regulatory Basis or Authority
Current DOE operations after remediation	Landfill— no unauthorized intrusion into capped area	Exposure to subsurface soil and buried waste	Maintain integrity of containment barrier	<ol style="list-style-type: none"> <li>1. Visible access restrictions (warning signs)</li> <li>2. Control of activities (drilling or excavating)</li> <li>3. Publication of surveyed boundaries and descriptions of land-use controls in the INEEL Land Use Plan (DOE-ID 1996)</li> </ol>	<p>FFA/CO (DOE-ID 1991)</p> <p>Worker protection (10 CFR 835)</p> <p>National Oil and Hazardous Substances Pollution Control Plan (40 CFR Part 300)</p> <p>CERCLA [42 USC 9620 § 120(h)]</p> <p>Radiation protection of the public and ALARA principles (DOE Order 5400.5)</p>
DOE control post operations	Landfill— no unauthorized intrusion into capped area	Exposure to subsurface soil and buried waste	Maintain integrity of containment barrier	<ol style="list-style-type: none"> <li>1. Visible access restrictions (warning signs)</li> <li>2. Control of activities (drilling or excavating)</li> <li>3. Property lease requirements including control of land-use consistent with this RODs</li> </ol>	<p>FFA/CO (DOE-ID 1991)</p> <p>CERCLA [42 USC 9620 § 120(h)(5)]<sup>b</sup></p> <p>Hall Amendment of the National Defense Authorization Act<sup>c</sup> (Public Law 103-160)<sup>c</sup></p> <p>Property release restrictions (DOE Order 5400.5)</p>
Post DOE control	Landfill— no unauthorized intrusion into capped area	Exposure to subsurface soil and buried waste	Maintain integrity of containment barrier	Property transfer requirements including issuance of a finding of suitability to transfer and control of land use consistent with this ROD.	<p>FFA/CO (DOE-ID 1991)</p> <p>CERCLA [42 USC 9620 § 120(h)(3)]<sup>d</sup></p> <p>CERCLA [42 USC 9620 § 120(h)(3)(C)(ii)]<sup>e</sup></p> <p>CERCLA [42 USC 9620 § 120(h)(3)(A)(iii)]<sup>f</sup></p> <p>CERCLA [42 USC 9620 § 120(h)(1)-(3)]<sup>g</sup></p> <p>CERCLA [42 USC 9620 § 120(h)(4)]<sup>h</sup></p> <p>Property relinquishment notification (43 CFR)</p> <p>Criteria for Bureau of Land Management acceptance</p> <p>Excess property reporting requirements</p> <p>Property release restrictions (DOE Order 5400.5)</p>

**Table 12-1.** (continued).

Timeframe	Land Restriction <sup>a</sup>	Exposure Concern	Objective	Controls	Regulatory Basis or Authority
DOE control post operations	Limited residential	Various-minimal concern	Limit residential land use for depths greater than 10 feet	1. Visible access restrictions/ signs 2. Property lease requirements including control of land-use consistent with this ROD	FFA/CO (DOE-ID 1991)  CERCLA [42 USC 9620 § 120(h)(5)] <sup>b</sup>  Hall Amendment of the National Defense Authorization Act (Public Law 103-160) <sup>c</sup>  Property release restrictions (DOE Order 5400.5)
Post DOE control	Limited residential	Various-minimal concern	Limited residential land use	Property transfer requirements including issuance of a finding of suitability to transfer and control of land use consistent with this ROD.	FFA/CO (DOE-ID 1991) CERCLA [42 USC 9620 § 120(h)(3)] <sup>d</sup> CERCLA [42 USC 9620 § 120(h)(3)(C)(ii)] <sup>e</sup> CERCLA [42 USC 9620 § 120(h)(3)(A)(iii)] <sup>f</sup> CERCLA [42 USC 9620 § 120(h)(1)-(3)] <sup>g</sup> CERCLA [42 USC 9620 § 120(h)(4)] <sup>h</sup>  Property relinquishment notification (43 CFR 2372-1) <sup>i</sup>  Criteria for Bureau of Land Management acceptance of property 43 CFR 2374.2 <sup>j</sup>  Excess property reporting requirements (41 CFR 101-47.202-1,-2,-7) <sup>k</sup>  Property release restrictions (DOE Order 5400.5)

- a. Institutional controls are applicable only to sites where hazardous substances, pollutants, or contaminants are present that preclude unlimited land use. Surveillance will be conducted every 5 years to ensure that controls are in place.
- b. Notification to states of leases involving contamination. Concurrence of the EPA is requested on leases of NPL (54 FR 48184) sites.
- c. Consult with and request concurrence of EPA with proposed leases of sites that are on the NPL.
- d. A statement that remedial action is complete is required in the deed.
- e. If response action for which the federal government is responsible is not complete, restrictions, the response guarantee, the schedule for investigation and completion of all necessary response actions, and budget assurances must be included in the deed.
- f. A clause allowing the U.S. government access to the property must be included in the deed.
- g. A notice of information about hazardous substances present on the property must be included in the deed.
- h. Uncontaminated parcels of land must be identified and concurred with by the EPA administrator before termination of operations.
- i. A Notice of Intent with contamination information and protection needs is required to relinquish the property to the U.S. Department of Interior.
- j. Transfer to the U.S. Department of Interior must indicate continuation of DOE responsibility, as applicable.
- k. Report to the General Services Administration on contamination information and allowable land use for excess real property.

**Table 12-3.** Cost estimate summary for selected remedy at OU 4-13: Pond (CFA-04), SP Drainfield (CFA-08), AND Transformer Yard (CFA-10).

Planned Activity	Cost FY-99 (dollars)		
	Pond (CFA-04) Alternative 3a	SP Drainfield (CFA-08) Alternative 4	Transformer Yard (CFA-10) Alternative 3b
FFA/CO management and oversight	\$437,500	\$312,500	\$219,000
Remedial action			
Document preparation			
RD/RA SOW	\$54,000	\$54,000	\$54,000
RA work plan	\$63,000	\$63,000	\$63,000
Packaging, shipping, transportation documentation	N/A	N/A	\$78,000
Remedial action report	\$48,000	\$48,000	\$48,000
WAG-Wide RA — Five-Year Review	\$176,000	\$811,000	N/A
RD documentation preparation			
Safety analysis documentation (ASA and HSP)	\$100,500	\$100,500	\$100,500
Sampling and analysis plan	\$108,000	\$108,000	\$108,000
Prefinal inspection report	\$7,500	\$7,500	\$7,500
Remedial design			
Added institutional controls - Five-Year Reviews	\$10,000	\$200,000	N/A
Title design construction document package	\$85,000	\$59,500	\$60,000
Remedial action — construction subcontract			
Site characterization	\$1,394,000	\$248,000	\$76,000
Construction subcontract/GFE	\$1,245,059	\$3,280,000	\$322,000
Project/construction management allowance	\$202,701	\$534,000	\$37,000
Total Capital Costs	\$3,931,260	\$5,826,000	\$1,173,000
Operations (100-year Duration)			
Program management	N/A	\$3,385,000	N/A
Continued/new construction CFA caretaker/maintenance	N/A	\$2,460,000	N/A
Surveillance and monitoring	N/A	\$420,000	N/A
Total Operations Costs	0	\$6,265,000	0

**Table 12-3.** (continued).

Planned Activity	Cost FY-99 (dollars)		
	Pond (CFA-04) Alternative 3a	SP Drainfield (CFA-08) Alternative 4	Transformer Yard (CFA-10) Alternative 3b
Capital Cost Subtotal	\$3,931,260	\$5,826,000	\$1,173,000
Contingency @ 30%	\$1,179,378	\$1,747,800	\$351,900
Total Capital Cost in FY99 Dollars	\$5,110,638	\$7,573,800	\$1,524,900
Total Capital Cost in Net Present Value	\$4,766,092	\$6,508,000	\$1,442,000
O&M Cost Subtotal	N/A	\$6,265,000	N/A
Contingency @ 30%	N/A	\$1,879,500	N/A
Total O&M Cost in FY99 Dollars	N/A	\$8,144,500	N/A
Total O&M Cost in Net Present Value	N/A	\$3,486,000	N/A
Total Project Cost in FY 1999 Dollars	\$5,110,638	\$15,718,300	\$1,524,900
Total Project Cost in Net Present Value Dollars	\$4,766,092	\$9,994,000	\$1,442,000

ASA = Auditable Safety Analysis  
 HSP = Health and Safety Plan  
 GFE = government furnished equipment.

## 13. STATUTORY DETERMINATIONS

### 13.1 CFA-04 Pond

#### 13.1.1 Protection of Human Health and the Environment

The selected remedy for CFA-04 Pond—excavation and disposal of mercury-contaminated soil to an approved facility at INEEL—provides highly effective, long-term protection of human health and the environment. The selected remedy most cost-effectively meets the threshold and balancing criteria of the three remedies considered. The removal of the mercury-contaminated soil from CFA-04 will eliminate potential short-term and long-term human health and environmental threats. The ICDF will provide isolation of the contaminated soil and prevent adverse effects to human health or the environment.

**13.1.1.1 Compliance with ARARs.** The selected remedy will be designed to comply with all action-specific and location-specific federal and state ARARs as listed in Table 13-1. The selected remedial design will achieve the FRG of 0.50 mg/kg for mercury. This represents 10 times the background concentration of mercury. Available data indicate that approximately 612 m<sup>3</sup> (800 yd<sup>3</sup>) of soil to be excavated from CFA-04 contain levels of leachable mercury above the RCRA characteristic hazardous waste levels. This soil will be treated prior to disposal to meet applicable RCRA land disposal restriction treatment standards. All applicable emission control standards shown in Table 13-1 will be met during the excavation and disposal of the soil. Applicable provisions of Department of Energy Order 5400.5, *Radiation Protection of the Public and the Environment* will be met. The selected remedy will comply with all ARARs.

#### 13.1.2 Cost-Effectiveness

Cost-effectiveness is a determination of whether the cost of a remedy is proportional to the overall effectiveness of the remedy. The long-term effectiveness is rated as high because mercury-contaminated soil will be permanently removed and disposed of to a RCRA-compliant facility. The portion of the soil that exceeds RCRA characteristic hazardous waste levels will be treated by stabilization with cement to achieve land disposal restrictions. A reduction in mobility for that portion of the contaminated soil will be achieved. The short-term effectiveness is moderate because some workers may be exposed to contaminated soil during excavation. Off-INEEL disposal could be implemented sooner than on-INEEL disposal. However, the costs would almost double if off-site disposal is required. The selected remedy is the most cost-effective alternative.

#### 13.1.3 Use of Permanent Solutions and Alternative Treatment Technologies

The selected remedy uses a permanent solution to the maximum extent practicable. Treatment through stabilization with cement will be used for that portion of the soil that exceeds the TCLP standard for mercury. The mobility of mercury in CFA-04 soil above the FRG will be reduced by placement in an approved disposal facility. Mercury-contaminated soil above the FRG will be permanently removed from the CFA-04 Pond and disposed in an approved facility, thereby eliminating human and environmental exposure. This alternative will prove to be very effective in the long term and provides the best balance between long-term effectiveness and permanence.

#### 13.1.4 Preference for Treatment as a Principal Element

Alternatives incorporating ex situ treatment of the mercury-contaminated soil do not significantly increase the long-term effectiveness, permanence, or protection of human health and the environment-

**Table 13-1.** ARARs and TBCs for the selected remedies for CFA-04, CFA-08, and CFA-10

Category	Citation	Reason	Relevancy <sup>a</sup>
<b>Action Specific ARARs</b>			
Rules for the Control of Air Pollution in Idaho	Toxic Air Emissions (IDAPA 16.01.01.585 and .586)	The release of carcinogenic and noncarcinogenic contaminants into the air must be estimated before the start of construction, controlled, if necessary, and monitored during excavation and sorting of soil.	A
	Fugitive Dust (IDAPA 16.01.01.650 and .651)		
National Emission Standards for Hazardous Air Pollutants	Radionuclide Emissions from DOE Facilities (40 CFR 61.92)	Requires control of dust during excavation and removal of soil.	A
	Emission Monitoring (40 CFR 61.93)	Limits exposure of radioactive contamination release to 10 mrem/year for the off-Site receptor and establishes monitoring and compliance requirements.	A
Resource Conservation and Recovery Act— Standards Applicable to Generators of Hazardous Waste	Hazardous Waste Determination (IDAPA 16.01.05.006) (40 CFR 262.11)	A hazardous waste determination is required for the soil and any secondary waste generated during remediation. Not an ARAR for CFA-08.	A
	Temporary Units IDAPA 16.01.05.008 (40 CFR 264.553)	Applies to temporary (<1 year) storage or treatment units.	A
	Remediation waste staging piles IDAPA 16.01.05.008 (40 CFR 264.554)	Excavated soils can be temporarily stage prior to disposal.	A
	Storm water discharge during construction 40 CFR 122.26	Will be met during excavation and disposal through engineering controls.	A
	Land disposal restrictions (LDR) IDAPA 16.01.05.011 (40 CFR 268)	Applies only to soils that have triggered placement. Not for CFA-08.	A
	Alternative LDR treatment standards for contaminated soils IDAPA 16.01.05.011 (40 CFR 268.49)	Applies only to soils that have triggered placement, not for CFA-08.	A

**Table 13-1.** (continued).

Category	Citation	Reason	Relevancy <sup>a</sup>
Chemical-specific	Closure and Post Closure Care of Landfills 40 CFR 264.310(a)(1-5)	Although waste in CFA-08 is not RCRA hazardous, the design and maintenance for soil cover will be followed	B
	Hazardous waste characteristics identification IDAPA 16.01.05.005 (40 CFR 261.20–24)	Applies if the soils are excavated and consolidated to facilitate their management and for soils that are treated or placed in a long-term storage unit.	A
Location-Specific ARARs			
National Historic Preservation Act	Historic properties owned or controlled by Federal Agencies (16 USC 4691.2)	The site must be surveyed for cultural and archeological resources before construction and for appropriate actions taken to protect any sensitive resources	A
	Identifying Historic Properties (36 CFR 800.4)		A
	Assessing Effects (36 CFR 800.5)		A
Native American Graves Protection and Repatriation Act	Custody (25 USC 3002)	The site must be surveyed for cultural and archeological resources prior to construction and for appropriate actions taken to protect any sensitive resources.	A
	Repatriation (25 USC 3005) (43 CFR 10.10)		A
To-be considered (TBC) guidance			
Radiation protection of the Public and the Environment for CFA-08 only.	(DOE Order 5400.5, Chapter II [1][a,b])	Limited the effective dose to the public from exposure to radiation source and airborne releases.	B
a. Relevancy: A = Applicable B= TBCs are not classified as applicable or relevant and appropriate. LDR - Land Disposal Restrictions			

than removal and disposal alone. These methods are also more expensive. Treatment is only required for the portion of soil with mercury concentrations in excess of the RCRA characteristic hazardous waste levels for land disposal. The statutory preference for treatment is achieved to the maximum extent practicable.

### **13.1.5 Five-Year Reviews**

Because this remedy will remove hazardous substances and contaminants above levels that allow for unlimited use and unrestricted exposure, five-year statutory reviews will not be required.

## **13.2 CFA-08 Sewage Plant Drainfield (OU 4-08)**

### **13.2.1 Protection of Human Health and the Environment**

The selected remedy for the CFA-08 SP Drainfield—containment of cesium-137- contaminated soil through capping—provides effective, long-term protection of human health and the environment. The selected remedy most cost-effectively meets the threshold and balancing criteria of the three remedies considered. It effectively isolates the contaminated soil and breaks the external exposure pathway in both the short- and long-term. Natural radioactive decay is projected to reduce the cesium-137 concentrations to levels that do not pose an unacceptable risk to human health and the environment in 189 years.

**13.2.1.1 Compliance with ARARs.** The selected remedy will be designed to comply with all action-specific and location-specific federal and state ARARs as listed in Table 13-1. Available data indicate that no RCRA contaminated media are present at the CFA-08 drainfield. All applicable emission control standards shown in Table 13-1 will be met during the construction. DOE Order 5400.5, “Radiation Protection of the Public and the Environment,” (DOE, 1990) will be met by implementing and enforcing applicable provisions of that order. Therefore, the selected remedy will comply with all ARARs.

### **13.2.2 Cost-Effectiveness**

Cost-effectiveness is a determination of whether the costs of a remedy are proportional to the overall effectiveness of the remedy. The long-term effectiveness of capping the drainfield is rated as high because it would break the external exposure pathway until the human health risks from cesium-137 fall below threshold levels. The short-term effectiveness is moderate, because although the risks from direct exposure will be reduced in the near future, some workers potentially will be exposed to contaminated soil during construction. Although the containment remedy is approximately twice as expensive as the Limited Action (institutional control) alternative, the long-term effectiveness is greater because capping will prevent external exposure from cesium-137 during the calculated 189-year timeframe required for levels to fall below acceptable risk levels. Therefore, the selected remedy is the most cost-effective alternative.

### **13.2.3 Use of Permanent Solutions and Alternative Treatment Technologies**

This selected remedy uses a permanent solution to the maximum extent practicable. The engineered cap is projected to be effective over the 189-year timeframe until natural radioactive decay of cesium-137 causes concentrations to fall below acceptable exposure levels. Therefore, this remedy achieves a high degree of long-term effectiveness. After 189 years, the remedy can be considered to be permanent because radiation from cesium-137 will no longer pose an unacceptable risk to human health.

#### **13.2.4 Preference for Treatment as a Principal Element**

This remedy does not use treatment to reduce toxicity, mobility or volume for the following reasons. Natural radioactive decay is the only means to reduce the toxicity of radionuclides. Reduction in mobility is not applicable because the risk from the cesium-137 contaminated soil is from external exposure. Other attempts to reduce the volume of radionuclide-contaminated soil through physical separation have not been successful at the INEEL.

#### **13.2.5 Five-Year Reviews**

ICs consisting of monitoring, access restriction, and runoff-control technologies will be used as a part of this remedy. Therefore, five-year statutory reviews will be required for this remedy.

### **13.3 CFA-10 Transformer Yard (OU 4-09)**

#### **13.3.1 Protection of Human Health and the Environment**

The selected remedy for the CFA-10 Transformer Yard—excavation, treatment and disposal of lead-contaminated soil at an off-site facility—provides highly effective, short- and long-term protection of human health and the environment. The selected remedy most cost-effectively meets the threshold and balancing criteria of the remedies considered. The removal of the lead-contaminated soil from CFA-10 will eliminate potential short-term and long-term human health and environmental threats. A permitted off-site disposal facility will provide isolation of the contaminated soil and prevent exposure to humans or the environment.

**13.3.1.1 Compliance with ARARs.** This selected remedy will be designed to comply with all the action-specific and location-specific federal and state ARARs listed in Table 13-1. The selected remedial design will achieve the FRG of 400 mg/kg of lead in soil remaining on site. Excavated soil with lead concentrations exceeding 5 mg/L TCLP will be stabilized with cement prior to disposal. All applicable emission control standards will be met during the excavation and disposal of the soil (DOE-ID 1999a). Therefore, the selected remedy will comply with all ARARs.

#### **13.3.2 Cost-Effectiveness**

Cost-effectiveness is a determination of whether the costs of a remedy are proportional to the overall effectiveness of the remedy. The long-term effectiveness is rated as high because lead-contaminated soil will be permanently removed and disposed to an approved, permitted off-INEEL facility. The short-term effectiveness is moderate in that some workers potentially will be exposed to contaminated soil during excavation. The selected remedy is slightly more expensive than the on-INEEL disposal alternative (\$1.4 million vs. 1.3 million, respectively). However, off-INEEL disposal can be implemented sooner because the ICDF will not be operational until 2004. Therefore, the selected remedy is the most cost-effective alternative.

#### **13.3.3 Use of Permanent Solutions and Alternative Treatment Technologies.**

This selected remedy uses a permanent solution to the maximum extent practicable. Treatment through stabilization with cement, of CFA-10 soil with TCLP concentrations greater than 5mg/kg, will reduce the mobility of lead. Lead-contaminated soil exceeding the FRG will be permanently removed from the CFA- 10 Transformer Yard and disposed of at an approved off-INEEL facility, thereby

eliminating human and environmental exposure. This alternative will prove to be very effective in the long-term and provides the best balance between long-term effectiveness and permanence.

#### **13.3.4 Preference for Treatment as a Principal Element**

The statutory preference for treatment through reduction in toxicity, mobility, or volume is met to the maximum extent practicable with the selected remedy. Soil exceeding the lead FRG of 400 mg/kg and the lead TCLP limit of 5 mg/L will be excavated, stabilized with cement to reduce mobility, and disposed of in an off-INEEL facility. No treatment technologies exist to reduce the toxicity or volume of lead-contaminated soil. Therefore, the statutory preference for treatment is achieved to the maximum extent practicable.

#### **13.3.5 Five-Year Reviews**

Because this remedy will remove hazardous substances and contaminants above levels that allow for unlimited use and unrestricted exposure, five-year statutory reviews will not be required.

## **14. DOCUMENTATION OF SIGNIFICANT CHANGES**

### **14.1 Modification of the Preferred Alternative for CFA-08**

Alternatives 3a and 3b for the CFA-08 Sewage Plant Drainfield use SGS as the treatment option in the Proposed Plan. The SGS was proposed to reduce the volume of contaminated soil disposed to on- or off-INEEL locations by ex situ separation. A treatability study on SGS was performed by WAG 5 in 1999 (DOE-ID 1999b). The results of the study indicate that cesium-137 contaminated soil at WAG 5 cannot be successfully sorted to satisfy the 2.3 pCi/g FRG for cesium-137 with any volume reduction. As a result, Alternatives 3a and 3b are shown without treatment and the preferred remedy is Alternative 4.

### **14.2 CFA-04 Information**

Table 3 on page 11 and Table 7 on page 1 of the Proposed Plan indicate that the human health hazard index for mercury is 62 at CFA-04. The calculated HQ is 80 as shown in Appendix D, Table D-46 of the RI/FS (DOE-ID 1999a). The values in the Proposed Plan were taken from Section 7 of the RI/FS, which was not updated to reflect the calculated risk values prior to finalization.

Table 3 also shows the FRG for mercury at CFA-04 is 0.74 mg/kg, when it is reported in this ROD as 0.5 mg/kg. The 0.5 mg/kg number represents the average background concentration for composited samples, whereas 0.74 mg/kg is the average background for discrete samples. Because the samples will be composited for analysis during remediation of the pond, 0.5 mg/kg is the appropriate FRG.

The cost estimate for the selected remedy at CFA-04 was \$6.9 million NPV in the RI/FS and the Proposed Plan, whereas the estimated cost in this ROD is shown in Table 12-3 as \$4.8 million NPV. The cost estimate in this ROD is lower because costs have been recalculated and ICDF disposal costs that will be borne by WAG 3 have been eliminated from the CFA-04 cost estimate. (These modifications are documented in DOE-ID 2000d.)

The Proposed Plan states that Alternative 3b, off-INEEL disposal would be the contingent remedy if the ICDF is not operational. By remediating CFA-04 last (CY-03), it is believed that the ICDF will be operational for disposal of the contaminated and stabilized soil.

### **14.3 OU 4-13A Interim Action Proposed Plan**

The Proposed Plan for this ROD was titled the OU 4-13A Interim Action Proposed Plan. The following paragraphs explain the naming differences between the OU 4-13 RI/FS, the OU 4-13A Interim Action Proposed Plan, and this OU 4-13 Comprehensive ROD. These changes are a logical outgrowth of the Proposed Plan and other documents in the AR.

Although no unacceptable risks were identified in the OU 4-13 RI/FS via groundwater use at WAG 4, a subsequent report for the OU 4-12 Post-ROD monitoring program identified that nitrate in two wells at WAG 4 was above a federal drinking water MCL of 10 mg/L. On this basis, the Agencies initially decided to separate OU 4-13 into two investigations: OU 4-13A was designated as an Interim Action ROD, and OU 4-13B, which was planned as the groundwater RI/FS. Therefore, the Proposed Plan for the OU 4-13 investigation was retitled the OU 4-13A Interim Action Proposed Plan when it was issued in August 1999.

Subsequent to this decision, information was gathered regarding the likely source and extent of nitrate in the wells. Additionally, a higher allowable level for nitrate was identified in the Federal Regulations that apply when the water is not available to infants under 6 months of age. The average nitrate concentration in one of the subject wells is equal to the MCL; nitrate concentrations in the other

well are less than the allowable MCL and show a downward trend. On that basis, the Agencies decided to eliminate the OU 4-13B RI/FS and maintain the original name, which is the OU 4-13 Comprehensive ROD. Groundwater will continue to be evaluated under the OU 4-12 Post-ROD monitoring program.

#### **14.4 Ecological Sites and Risks**

On page 8 of the proposed plan, sites that were retained for cumulative site-wide investigation are listed as CFA-01, CFA-02, CFA-05, CFA-13, CFA-17, CFA-21, CFA-26, CFA-41, CFA-43, and CFA-47. The sites retained for further evaluation are CFA-01, CFA-02, CFA-05, CFA-13, CFA-41, and CFA-43, based on further screening of contaminants with HQ less than 10.

On page 7 of the proposed plan, the maximum acceptable level of copper and lead for CFA-10 was listed as 320 and 400 respectively. The maximum acceptable level, or 10 times background values, listed in the RI/FS are 220 and 170 respectively.

## 15. REFERENCES

- Public Law 103-160, November 30, 1993, Hall Amendment, which amended Section 3154 of the National Defense Authorization Act for Fiscal Year 1994, which amended Section 646 of the Department of Energy Organization Act (42 USC 7256).
- 10 CFR 20, 1999, *Standards for Protection Against Radiation*, Appendix B, Table 2, Code of Federal Regulations, U.S. Government Printing Office, January.
- 10 CFR 835, *Code of Federal Regulations*, Title 10, “Energy,” Part 20, “Standards for Protection Against Radiation.”
- 36 CFR 800.4, *Code of Federal Regulations*, Title 36, “Parks, Forests and Public Property”, Part 800, “Protection of Historic Properties”, “Identification of Historic Properties”.
- 40 CFR 61, *Code of Federal Regulations*, Title 40, “Protection of the Environment,” Part 61, “National Emission Standards for Hazardous Air Pollutants.”
- 40 CFR 141, *Standards for Protection of the Environment*, “National Primary Drinking Water Regulations,” Code of Federal Regulations.
- 40 CFR 143, *Standards for Protection of the Environment*, “National Secondary Drinking Water Regulations,” Code of Federal Regulations.
- 40 CFR 262.11, *Code of Federal Regulations*, Title 40, Protection of the Environment, Part 262, Standards Applicable to Generators of the Hazardous Wastes,” Subpart 11, “Hazardous Waste Identification.”
- 40 CFR 264.13, *Code of Federal Regulations*, Title 40, Protection of the Environment, Part 262, “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Subpart 13, “General Waste Analysis,”
- 40 CFR 264.310, *Code of Federal Regulations*, Title 40, Protection of the Environment, Part 262, “Standards for Owners and Operators of Hazardous Waste Treatment Storage, and Disposal Facilities,” Subpart 310, “Closure and Post-Closure Care.”
- 40 CFR 268.40, *Code of Federal Regulations*, Title 40, Protection of the Environment, Part 268, “Land Disposal Restrictions,” Subpart 40, “Applicability of Treatment Standards.”
- 40 CFR 268.49, *Code of Federal Regulations*, Title 40, Protection of the Environment, Part 268, “Land Disposal Restrictions,” Subpart 49, “Alternate LDR Treatment Standards for Contaminated Soil.”
- 40 CFR 300, *Code of Federal Regulations*, “National Oil and Hazardous Substances Pollution Contingency Plan.”
- 41 CFR 101, *Code of Federal Regulations*, Title 41, “Public Contracts and Property Management” Part 101, *Federal Property Management Regulations*, Subpart 47, “Utilization and Disposal of Real Property.”

- 43 CFR 2372.1, *Code of Federal Regulations*, Title 43, “Public Lands Interior,” Part 2732, “Procedures,” Subpart .1, “Notice of Intention to Relinquish Action by Holding Agency.”
- 43 CFR 2374.2, *Code of Federal Regulations*, Title 43, “Public Lands Interior,” Part 2734, “Acceptance of Jurisdiction by BLM.”
- 54 FR 48184, 1997, “National Priorities List of Superfund Sites, Final Rule,” *Federal Register* U.S. Environmental Protection Agency. *United States Code*.
- 56 FR 50634, 1991, “Sole Source Designation of the Eastern Snake River Plain Aquifer, Southern Idaho; Final Determination,” U.S. Environmental Protection Agency, *Federal Register*.
- 16 USC 469, “National Archeological and Historical Preservation Act.” June 1960.
- 25 USC 3002, “Native American Graves Protection and Repatriation Act,” November 1990.
- 42 USC § 4321 et seq., 1970, “National Environmental Policy Act,” *United States Code*, January 1.
- 42 USC § 6901 et seq., 1976, “Resource Conservation and Recovery Act (Solid Waste Disposal Act),” *United States Code*, October.
- 42 USC § 9601 et seq., 1980, “Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA/Superfund), *United States Code*, December.
- 42 USC § 9620 § 120[h], October 17, 1986, “Federal Facilities,” *United States Code*.
- Albanus, L. L., et al., 1972, “Toxicity for Cats of Methylmercury in Contaminated Fish from Swedish Lakes and of Methylmercury Hydroxide Added to Fish,” *Environmental Research*, Vol. 5, No. 4, pp. 425-429.
- Amdur, M. O., T. Doull, and C. D. Klaassen, 1991, *Casarett and Doull’s Toxicology, The Basic Science of Poisons*, 4<sup>th</sup> ed., Pergaman Press.
- Arthur, W. J., et al., 1984, *Vertebrates of the Idaho National Engineering Laboratory*, DOE/ID-12099, U.S. Department of Energy Idaho Operations Office, Radiological and Environmental Sciences Laboratory.
- ATSDR, 1990, *Toxicological Profile for Lead*, Agency for Toxic Substance Disease Registry.
- Aulerich, R. J., R. K Ringer, and J. Iwamoto, 1974, “Effects of Dietary Mercury on Mink,” *Archives of Environmental Contamination and Toxicology*, Vol. 2, pp. 43–51.
- Baes, C. F., III, R. D. Sharp, A Sjoreen, and R. Shor, 1994, *A Review and Analysis of Paramaters for Assessing Transport of Environmentally Released Radionuclides Through Agriculture*, ORNL-5786, U.S. Department of Energy, Oak Ridge National Laboratory, Oak Ridge, TN.
- Benedict, M. Pigford, T. H., and H. W. Shor, 1981, *Nuclear Chemical Engineering*, Second edition, McGraw-Hill, Inc., pp. 1,008.

- Beyer, W. N., E. E. Conner, and S. Geroud, 1994, "Estimates of Soil Ingestion by Wildlife," *Journal of Wildlife Management*, 58, pp. 375-382.
- Borg, K., et al., 1970, "Experimental Secondary Methyl Mercury Poisoning in the Goshawk, *Accipiter G. gentiles* L. *Environmental Pollution*, Vol. 1, pp 91-104.
- Callahan, M. A., et al., 1979, *Water-Related Environmental Fate of 129 Priority Pollutants*, EPA 440/4-79-029a, U.S. Environmental Protection Agency, Office of Water Planning and Standards, Washington, D.C.
- Charbonneau, S. M., et al., 1976, "Chronic Toxicity of Methymercury in the Adult Cat, Interim Report," *Toxicology*, Vol. 5, No. 3, pp. 337-349.
- COCA, 1987, Resource Conservation and Recovery Act, 3008(h), *Consent Order and Compliance Agreement*, U.S. Environmental Protection Agency, July 10, 1987.
- Colle, A., et al., 1980, "Lead Poisoning in Monkeys: Functional and Histopathological Alternation of the Kidneys," *Toxicology*, Vol. 18, pp. 145-158.
- DeMayo, A., et al., 1982, "Toxic Effects of Lead and Lead Compounds on Human Health, Aquatic Life, Wildlife, Plants, and Livestock," *CRC Critical Review Environmental Control*, Vol. 12, pp. 257-305.
- Dieter, M. P., and M. T. Finley, 1978, "Erythrocyte Gamma-Aminolevulinic Acid Dehydrates Activity in Mallard Ducks: Duration of Inhibition After Lead Shot Dosage," *Journal of Wildlife Management*, Vol. 42, pp. 621-625 (cited in Eisler 1998).
- DOE, 1994, *Secretarial Policy Statement on the National Environmental Policy Act*, U.S. Department of Energy, June.
- DOE-ID, 1986, *Consent Order and Compliance Agreement with Region 10 of the EPA and the U.S. Geological Survey*, July 28.
- DOE-ID, 1989, *Climatography of the Idaho National Engineering Laboratory*, 2<sup>nd</sup> ed., (U.S. Department of Energy, Idaho Operations Office, DOE/ID-12118, December.
- DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*, U.S. Department of Energy, Idaho Operations Office, U.S. Environmental Protection Agency, Region 10; State of Idaho, Department of Health and Welfare, 1088-06-29-120, December.
- DOE-ID, 1992a, *Record of Decision, Central Facilities Area Motor Pool Pond, Operable Unit 4-11, Waste Area Group 4*, U.S. Department of Energy, Idaho Operations Office, January.
- DOE-ID, 1994, *Track 2 Sites: Guidance for Assessing Low Probability Hazard Sites at the INEL*, DOE/ID-10389, Revision 6, U.S. Department of Energy, Idaho Operations Office, January.
- DOE-ID, 1995, *Record of Decision, Declaration for Central Facilities, Area Landfills I, II, and III (Operable Unit 4-12), and No Action Site (Operable Unit 4-03)*, U.S. Department of Energy, Idaho Operations, Office, October.

DOE-ID, 1996, *Idaho National Engineering Laboratory Comprehensive Facility and Land Use Plan*, Department of Energy Idaho Operations Office, DOE/ID-10514, March.

DOE-ID, 1997a, *Post Record of Decision Monitoring Work Plan, Central Facilities Area Landfills I, II, and III, Operable Unit 4-12*, U.S. Department of Energy Idaho Operations Office, INEL-95/0579, June.

DOE-ID, 1997b, *Work Plan for Waste Area Group 4 Operable Unit 4-13 Comprehensive Remedial Investigation/Feasibility Study*, U.S. Department of Energy, Idaho Operations Office, DOE/ID-10550, March.

DOE-ID, 1999a, *Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10680, February.

DOE-ID, 1999b, *Proposed Plan for Operable Unit 4-13A Interim Action, Waste Area Group 4 - Central Facilities Area, Idaho National Engineering and Environmental Laboratory*, U.S. Department of Energy, U.S. Environmental Protection Agency, Region 10, Idaho Department of Health and Welfare, Division of Environmental Quality, DOE/ID-10607, August.

DOE-ID, 2000a, *Post-Record of Decision Monitoring Report at Operable Unit 4-12, Central Facilities Area Landfills I, II, and III (CFA-01, CFA-02, and CFA-03)*, draft.

DOE-ID, 2000b, Engineering Design File, *Summary of Nitrate Evaluation at WAG 4*, draft.

DOE-ID, 2000c, Letter to EPA and IDHW requesting elimination of OU 4-13B, February 1, OPEER- 16-00.

DOE-ID, 2000d, *Engineering Design File Cost Modifications for the CFA-04 Remedial Action*, U.S. Department of Energy Idaho Operations Office.

DOE Order, 5400.5, February 8, 1990, *Radiation Protection of the Public and the Environment*, TS-OSD-NSSB.

Eaton, R. D., D. C. Secord, and P. Hewitt, 1980, "An Experimental Assessment of the Toxic Potential of Mercury in Ringed Seal Liver for Adult Laboratory Cats," *Toxicology and Applied Pharmacology*, Vol. 55, No. 3, pp. 514-521.

EG&G, 1981, *Draft Environmental Impact Statement, Long- Term Management of Defense High-Level Radioactive Waste, Idaho Chemical Processing Plant*, DOE/EIS-0074D, EG&G Idaho, Inc., December.

EG&G, 1984, *INEL Environmental Characterization Report*, Vol. 2, EGG-NPR-6688, EG&G Idaho, Inc., September.

EG&G, 1986, *Geohydrologic Story of the Eastern Snake River Plain and the Idaho National Engineering Laboratory*, EG&G Idaho, Inc., November.

EG&G, 1993, *Environmental Resource Document for the Idaho National Engineering Laboratory*, EGG-WMO-10279, EG&G Idaho, Inc., July.

- Eisler, R., 1987, *Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review* U.S. Fish and Wildlife Service Biological Report 85(1.10), U.S. Fish and Wildlife Service.
- Eisler, R., 1988, *Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review* U.S. Fish and Wildlife Service Biological Report 85(1.14), U.S. Fish and Wildlife Service.
- EPA, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C., EPA 540G-89-004, October.
- EPA, 1989, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, U.S. Environmental Protection Agency, EPA/540/I/1-89/002, December.
- EPA, 1991, *Supplemental Risk Assessment Guidance for Superfund*, U.S. Environmental Protection Agency, Region 10, August.
- EPA, 1992a, *Supplemental Guidance to RAGS: Calculating the Concentration Term*, Publication 9285.7-081, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., May.
- EPA, 1992b, *Framework for Ecological Risk Assessment*, Environmental Protection Agency, PB93-102192, EPA/63 O/R-92/001.
- EPA, 1994a, *Health Effects Assessment Summary Tables*, EPA 540-R-94-020, November.
- EPA, 1994b, OSWER 9555.4-12, *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, EPA 540/F-94/043, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response.
- EPA, 1995, *Risk-Based Concentration Table*, U. S. Environmental Protection Agency, Region 3.
- EPA, 1997a, *Risk-Based Concentration Table*, U.S. Environmental Protection Agency, Region 3.
- EPA, 1997b, *Integrated Risk Information System*, On-Line Database, Office of Research and Development, Cincinnati, OH.
- EPA, 1999a, Memorandum, *Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities*, U.S. Environmental Protection Agency, Region 10, Office of Environmental Cleanup, May.
- EPA, 1999b, *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, U.S. Environmental Protection Agency, 540-R-98-031, July.
- Fimreite, N., 1979, "Accumulation and Effects of Mercury on Birds," *Biochemistry of Mercury in the Environment*, ed. J. O. Nriagu, New York: Elsevier/North Holland Biomedical Press.
- Hoffman, D. J., et al., 1985, "Survival, Growth, and Accumulation of Ingested Lead in Nestling American Kestrels (*Falco sparverius*)," *Comparative Biochemistry and Physiology*, 80C pp. 431-439, as cited in Eisler 1998.

IC § 39-4401, Idaho Statutes, Title 39, "Health and Safety," Chapter 44, "Hazardous Waste Management," Idaho Hazardous Waste Management Act of 1983.

IDAPA 16.01.05, "Rules and Standards for Hazardous Waste," IDAPA 16, Title 01, Chapter 05.

IDAPA 16.01.11, "Rules of the Idaho Department of Health and Welfare," Title 01, Chapter 11, "Ground Water Quality Rule," Idaho Administrative Procedures Act.

INEEL, 1995a, *Large-Scale Aquifer Pumping Test Results*, Engineering Design File, EDF ER-WAG 7-56, February.

INEEL, 1995b, *Guidance Protocol for the Performance of Cumulative Risk Assessments at the INEL*, INEL-95/131, Revision 0, May.

INEEL, 1995c, *Preliminary Scoping Track 2 Summary Report for Operable Unit 4-10*, INEL-95/0087, Revision 11, March.

INEEL, 1995d, *Preliminary Scoping Track 2 summary Report for Central Facilities Area Operable Unit 4-08*, INEL-95/0111, Revision 0, August.

INEEL, 1996a, *Preliminary Scoping Track 2 Summary Report for Operable Unit 4-05*, INEL-95/0626, Revision 0, April.

INEEL, 1996b, *Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for Idaho National Engineering Laboratory*, INEL-94/0250, Revision 1, August.

INEEL, 1999, *Summary Report for the Segmented Gate System Treatability Study*, INEEL/EXT-99-00073, Revision 0.

Irving, J. S., July 1993, *Environmental Resource Document for the Idaho National Engineering Laboratory*, EGG-WMO- 10279, EG&G Idaho, Inc.

Khera, K. S., 1973, "Reproductive Capability of Male Rats and Mice Treated with Methylmercury," *Toxicology and Applied Pharmacology*, Vol. 24, p. 167.

Khera, K. S., and S. A. Tabacova, 1973, "Effects of Methylmercuric Chloride on the Progeny of Mice and Rats Treated Before or During Gestation," *Food and Cosmetic Toxicology*, Vol. 11, pp. 245-254.

Kimmel, C. A., et al., 1980, "Chronic Low Level Lead Toxicity in the Rat. I. Maternal Toxicity and Perinatal Effects," *Toxicology and Applied Pharmacology*, Vol. 56, pp. 28-41.

Manzo, L., et al., 1992, "Metabolic Studies as a Basis for the Interpretation of Metal Toxicity," *Toxicology Letters*, Vol. 64/65, pp. 677-686.

Martin, D., 1991, "Lead Poisoning in Children - An Analysis of the Causes and Proposals for Prevention," *Journal of Environmental Health*, Vol. 54, pp. 18 and 19.

Nagy, K. A., 1987, "Field Metabolic Rate and Food Requirement Scaling in Mammals and Birds," *Ecological Monograph*, Volume 57, pp. 111-128.

- Osborn, D. W., J. Eney, and K. R. Bull, 1983, "The Toxicity of Trialkyl Lead Compounds to Birds," *Environmental Pollution*, Vol. 31A, pp. 261-275 (as cited in Eisler 1998).
- Reynolds, T. D., et al., 1986, "Vertebrate Fauna of the Idaho National Engineering Laboratory," *Great Basin Naturalist*, 46:513-527.
- Scheuhammer, A. M., 1987, "The Chronic Toxicity of Aluminum, Cadmium, Mercury, and Lead in Birds: A Review," *Environmental Pollution*, Vol. 46, No. 4, pp. 263-296.
- Sittig, M., 1985, *Handbook of Toxic and Hazardous Chemicals*, 2<sup>nd</sup> ed., Park Ridge, New Jersey: Noyes Publications.
- Suter, G. A. II, M. E. Will, and C. Evans, 1993, *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota on the Oak Ridge Reservation, Oak Ridge, Tennessee*, ORNL/ER-139ES/ER/TM-85, Energy Systems Environmental Restoration Program, ORNL Environmental Restoration Program, Oak Ridge National Laboratory, September.
- Travis, C. C. and A. D. Arms, 1988, "Bioconcentration of Organics in Beef, Milk, and Vegetation," *Environmental Science and Technology*, Volume 22, pp. 271-274.
- Wobeser, G. A., N. O. Nielson, and B. Schiefer, 1976, "Mercury and Mink. 2. Experimental Methylmercury Intake in Mink," *Canadian Journal of Comparative Medicine*, Vol. 40, pp. 34-55.
- Wren, C. D., 1986, "Review of Metal Accumulation and Toxicity in Wild Animals, I. Mercury," *Environmental Research*, Vol. 40, No. 1, pp. 210-244.
- Wren, C. D., et al., 1987, "The Effects of Polychlorinated Biphenyls and Methylmercury, Singly and in Combination, on Mink, II: Reproduction and Kit Development," *Archives of Environmental Contamination and Toxicology*, Vol. 16, pp. 449-454.
- Zmudzki, et al., 1983, "Lead Poisoning in Cattle: Reassessment of the Minimum Toxic Oral Dose," *Bulletin of Environmental Contaminants*, Vol. 30, p. 435-441.

# Part III—Responsiveness Summary

## 1. INTRODUCTION

The purpose of this Responsiveness Summary is to provide a clear and concise measure of: (1) which aspects or elements of the alternatives for WAG 4 the community supports, opposes, or has reservations about, and (2) general concerns about the sites and the CERCLA process at those sites. This Responsiveness Summary identifies and responds to more than 40 statements of preferences, concerns, comments, and questions received both as formal statements at three public meetings, held on August 17, 18, and 19, 1999, and as written comments in more than 10 pages of materials from at least 12 individuals and interested groups. All comments on the August 1999 Proposed Plan were considered in preparation of the ROD and this Responsiveness Summary and are included verbatim in the Administrative Record for WAG 4. The comments cover a wide range of issues, including:

1. The WAG 4 cleanup in general, specific CFA sites, and the proposed INEEL CERCLA Disposal Facility (ICDF)
2. Past disposal practices
3. Goals for public participation and education
4. The criteria used to compare alternative remedies, identify feasible cleanup methods evaluate technologies, and ensure long-term protection to human health and the environment
5. Uncertainties associated with the CERCLA process and WAG 4 contamination, specifically.

Written comments received and formal statements made at the public meetings showed that community acceptance of the preferred alternatives, as presented in the Proposed Plan, ranges from support, to support with reservations. As documented in this Responsiveness Summary:

1. The preferred alternative of Excavation, Treatment by Stabilization, and On-Site Disposal for the Pond (CFA-04) was generally supported. Commenters asked for more details on aspects of cost and technical implementation of the preferred alternative, and clarification of why phytoremediation could not be considered for this site. This information has been provided in Section 3.3.1 of this Responsiveness Summary.
2. The preferred alternative of Containment for the Sewage Treatment Plant Drainfield (CFA-08) was not opposed in any comments received. At the request of several commenters, additional information describing the contaminant of concern has been provided in this Responsiveness Summary.
3. The preferred alternative of Excavation, Treatment by Stabilization, and Off-INEEL Disposal for the Transformer Yard (CFA-10) was supported by public comment. Additional information on the timing of the remedial action was requested and has been provided in Section 3.3.2 of this Responsiveness Summary.

During the WAG 4 public comment period, additional questions were submitted on several subjects not related to the WAG 4 remediation, such as questions about the Advanced Mixed Waste

Treatment Facility. While these queries were not relevant to this Responsiveness Summary, additional information on these subjects is available by writing or calling:

Ann Riedesel  
Public Communications Coordinator  
BNFL Inc.  
(208) 524-8484  
[www.amwtp.com](http://www.amwtp.com) or [ariedesel@bnflinc.com](mailto:ariedesel@bnflinc.com)

Information about the Advanced Mixed Waste Treatment Project is available on the internet at <http://environment.inel.gov/wm/amwtp.cfm>

Copies of all documents referenced in this Responsiveness Summary can be obtained by writing or calling the INEEL Community Relations Office at the address provided above. Many of the documents also are available on the internet at <http://environment.inel.gov/>.

## **2. BACKGROUND ON COMMUNITY INVOLVEMENT**

The Proposed Plan for WAG 4 was released in August 1999. During the 30-day public comment period, three public meetings were held, in Idaho Falls, Boise, and Moscow. The comment period was extended an additional 30 days in response to requests from members of the public. All written comments received before the close of the comment periods, and oral comments made during the formal comment session of each public meeting, are responded to by the Agencies in this Responsiveness Summary.

Each public meeting included an informal question and answer session as well as the formal public comment session. The meeting format was described in published announcements and meeting attendees were reminded of the format at the beginning of each meeting. The informal question-and-answer session was designed to provide immediate responses to the public's questions and concerns. Several questions were answered during the informal question-and-answer periods during the public meetings on the Proposed Plan. This Responsiveness Summary does not attempt to summarize or respond to issues and concerns raised during that part of the public meeting. However, written transcripts of the meetings capture the presentations and informal questions and answers for members of the public that were unable to attend the meeting. The transcripts are included in the Administrative Record for WAG 4 and can be found at:

INEEL Technical Library  
DOE Public Reading Room  
1776 Science Center Drive  
Idaho Falls, ID 83415  
(208) 529-1185

Albertsons Library  
Boise State University  
1910 University Drive  
Boise, ID 83725  
(208) 385-1621

University of Idaho Library  
University of Idaho Campus  
434 2<sup>nd</sup> Street  
Moscow, ID 83843  
(208) 885-6344

An electronic copy of the Administrative Record is available on the internet at <http://ar.inel.gov>.

### 3. SUMMARY OF COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD

The public comment period for WAG 4 Proposed Plan (DOE-ID 1999c) began on August 5, 1999 ended October 4, 1999. Public meetings on the WAG 4 Proposed Plan were conducted in Idaho Falls on August 17, Boise on August 18, and Moscow on August 19, 1999. Written comments and the meeting transcripts are available in the three INEEL information repositories listed in Section 2 as part of the Administrative Record for the WAG 4 Comprehensive RI/FS.

Five members of the public provided oral comments on the Proposed Plan during the August public meetings. Eight groups or members of the public provided written comments. The thirteen comments and questions received during the public comment period have been summarized into succinct statements to capture the significant issue discussed or information requested and assigned individual numbers. The summaries were then grouped by topics and responses were prepared.

Table 1 identifies the members of the public who provided comments and their affiliation, if any. It also shows the alphanumeric designation given to their comments. Written comments are numbered W1 through W7 corresponding with the seven individual commenters or commenting groups who submitted them. Oral comments transcribed during the formal comment sessions of the public meetings are numbered according to the location of the meetings and the commenter (IF1 and IF2 from the Idaho Falls meeting; B1 and B2 from the Boise public meeting; and M1 from the Moscow public meeting).

Comments were further subdivided by identifying a numbering individual issues contained in the thirteen oral or written comments. Appendix A contains the original comments in their entirety, either as scanned written submissions or as public meeting formal comment period transcripts. It also contains a table showing the numbering system for the individual issues and the respective response number.

The Responsiveness Summary begins with a group of questions and comments on INEEL environmental remediation goals, the community relations process, and the budget and planning process for CFA remediation. The second group of questions and comments concerns the comprehensive remedial investigation and feasibility study (RI/FS) and the activities carried out during this process. The third group of questions and comments focuses on the individual sites retained for remedial action under this ROD, their descriptions, and the alternatives developed and evaluated for them. The final group covers tangential but significant concerns that some commenters felt were related to CFA remediation. Within the first three groups of questions and comments, issues are presented in an order parallel to the development of topics in the Proposed Plan. A total of 36 issues or topics are identified in this summary.

#### 3.1 WAG 4 Cleanup and Public Participation

##### 3.1.1 General Comments on WAG 4 Cleanup

1. A commenting group expressed support for the use of disposal and remediation actions that are technically appropriate and cost-effective. [W6-3] Another commenter expressed a low opinion of DOE's scientific and technical standards, and asked why better and more efficient cleanup technologies aren't used. [IF2-1]

**Response:** The remedial alternatives described in the Proposed Plan were selected from the range of technologies demonstrated to be effective for sites with similar contaminants and media. Preference was given to technologies that have been demonstrated at the

**Table 3-1. Oral and written comments for the WAG 4 Proposed Plan.**

Commenter Name	Affiliation or Organization (If provided)	City and State	Document Number Assigned	Number of Comments Identified
(b) (6)		Sun Valley, ID	W1	1
(b) (6)	INEEL Citizen Advisory Board	Idaho Falls, ID	W2	1
(b) (6)		Rigby, ID	W3	3
Jared Newman	ONYX Environmental Services	Garden City, ID	W4	3
(b) (6)		Jackson Hole, WY	W5	1
(b) (6)	Coalition 21	Idaho Falls, ID	W6	3
	INEEL Citizen Advisory Board	Idaho Falls, ID	W7	4
	Snake River Alliance		W8	11
	Snake River Alliance	Idaho Falls, ID public meeting	IF1	5
(b) (6)		Idaho Falls, ID public meeting	IF2	1
(b) (6)		Boise, ID public meeting	B1	4
(b) (6)		Boise, ID public meeting	B2	8
(b) (6)		Moscow, ID public meeting	M1	1

INEEL. Innovative and emerging technologies that have been demonstrated at a pilot-scale or greater also were considered.

Each category of possible remedial actions (e.g., containment; removal and disposal; removal, treatment, and disposal) includes many potential technologies. The WAG 4 feasibility study considered only those technologies that met or exceeded the criteria of effectiveness, implementability, and cost. Also considered for each potential technology are: potential impacts to human health and the environment during implementation; whether the technology has proven its reliability; whether the required permits can be obtained; whether treatment, storage, and disposal services are fully available; and the range of equipment and personnel that are required.

Cleanup activities conducted under CERCLA must be cost-effective. Cost-effectiveness is determined by evaluating three of the five balancing criteria that determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness. A remedy is considered to be cost-effective if its costs are proportional to its overall effectiveness.

2. A commenting group expressed approval that the technical feasibility of the Proposed Plan alternatives seems straightforward. [W8-1]

**Response:** Thank you. The feasibility of an alternative is determined by the application of three criteria: effectiveness (short-term and long-term), implementability, and cost. The preferred alternatives meet these criteria and this information was communicated in the Proposed Plan.

3. A commenting group noted that the term “interim action” is defined under CERCLA as “any action that will not result in full remediation.” However, the group emphasized that proposed remedial actions should constitute final remedies for the contamination sources they are designed to address. The group wrote that it has repeatedly expressed frustration at cleanup efforts that must be repeated, at great cost to taxpayers, because prior efforts were incomplete. All remedial actions taken at WAG 4 should completely and finally address the contamination present to avoid a need for follow-on remediation. [W7-1]

**Response:** As explained in Parts I and II, this ROD is now called the Comprehensive ROD. The selected remedies described in the Proposed Plan constitute final remedies or the three sites with surface contamination as well as no action sites that require institutional controls.

4. A commenter noted that it seems irrational that DOE dumped powdered waste containing mercury on the surface but buried less hazardous construction materials. The general DOE rationale for past disposal practices was questioned. [IF1-5]

**Response:** Although DOE’s past waste treatment, storage, and disposal practices were considered acceptable at the time, some practices led to the release of contaminants to the environment. As a result, DOE developed its environmental restoration program in 1989 to identify and, where necessary, clean up releases from past activities. In addition, a waste management program was developed to safely treat, store, and dispose of DOE waste generated by current and planned activities in an environmentally and economically sound manner.

### 3.1.2 Public Participation and Community Relations

5. A resident of Jackson Hole, Wyoming, commented on concerns in his region about the INEEL's general safety record and, specifically, whether there were real dangers to human health. He asked for information about the INEEL's recent environmental safety record and about cancer rates around the INEEL in comparison to other areas. He expressed concern about public ignorance of scientific issues which he feels lead to unwarranted distrust of the government. The commenter would like to learn more himself as well as to be able to better discuss issues with neighbors. [W5-1]

**Response:** The INEEL Health Effects Subcommittee is comprised of approximately 12 members from the public, the State of Idaho, the Shoshone-Bannock tribe, and other interest lay persons. They are tracking an INEEL Dose Reconstruction project that is being conducted by the National Center for Environmental Health of the Centers for Disease Control and Prevention. The purpose of this project is to assess human health effects from potential exposure to chemicals from the INEEL. The due date for the project report has not been established, but it is anticipated to be complete in the 1 to 2 year time-frame. Additionally, your comment was forwarded to the Community Relations Office to provide you with more information. The phone number is (208) 526-7400.

6. A commenter charged that DOE's public documents, in a pattern too consistent to be other than intentional, omit facts about the true extent of problems, which can then only be found through research into the Administrative Record. The commenter expressed disappointment that the regulatory agencies do not use their review of these documents to require that more extensive data be presented. [M1-1]

**Response:** Data that are salient to the remedial alternative evaluation and selection process are never intentionally omitted. The Proposed Plan is a summary of those sites at CFA where remedial action is required to protect human health and the environment from risks posed by past releases of contamination. It is based on the comprehensive RI/FS for WAG 4. The Proposed Plan is intended to be a high level document that summarizes the most important data that lead to a selected remedy; it is not intended to repeat all the data provided in the baseline documents. The Agencies believe that the Proposed Plan issued in August 1999 adequately summarizes the information in the comprehensive RI/FS.

7. A commenting group and an individual commenter appreciated the willingness of the INEEL to extend the original 30-day comment period. [W2-1, B2-7]

**Response:** The Agencies appreciate the public's interest and participation in the public comment period and were pleased to extend the comment period to allow the public ample time to prepare their comments.

8. Several commenters took issue with the Proposed Plan's statement that the INEEL contamination resulted from research activities. One commenter stated that this is a euphemism for what was really nuclear weapons work. [B1-1] The majority of contamination, certainly the most perilous, wrote a commenting group, came from weapons production activities. [W8-2, B2-8]

**Response:** The Agencies thank you for your input and will consider whether to discuss past and present defense-related activities as a source of contamination at the INEEL in future documents.

While the INEEL will most likely continue to support national defense initiatives, its present mission is to develop and transfer advanced engineering technology and systems to private industry to improve the competitiveness and security of the nation.

9. A commenting group urged public involvement in setting the waste acceptance criteria for the INEEL CERCLA Disposal Facility (ICDF). [W8-10] A commenter concerned about the waste acceptance criteria for disposal on the INEEL urged that there be public involvement in establishing the ICDF waste acceptance criteria. [B2-5]

**Response:** The Agencies signed a ROD for the Idaho Nuclear Technology and Engineering Center (INTEC; formerly the Idaho Chemical Processing Plant) on October 11, 1999. A major component of the ROD is the construction of the ICDF. The facility will be used to consolidate radioactively contaminated soil and debris from the INTEC and other areas on the INEEL. As described in Part II, Section 12.1.1 and 12.1.3, of this ROD, some materials from CFA are anticipated to be disposed of at the ICDF.

The development of the ICDF itself is part of the remedial design/remedial actions at WAG 3 at the INTEC. DOE has committed to hold at least one public meeting during the WAG 3 remedial design process to solicit input on the ICDF waste acceptance criteria. Questions about the ICDF can be directed to the INEEL Community Relations Office at (208) 526-4700 or (800) 708-2680.

10. A commenting group asked that the INEEL continue to hold briefings or meetings on all cleanup activities, progress, and problems. The group recommended quarterly briefings. [W8-11]

**Response:** The Agencies encourage citizen involvement in decision-making at the INEEL. Public meetings held in connection with Proposed Plans for cleanup are one of many avenues for public involvement. Other avenues include briefings and tours. Postal addresses, telephone numbers, e-mail addresses, and internet site addresses are provided in all informational materials published by the INEEL. Citizens can contact INEEL representatives through these means to get additional information, briefings, or tours from Agency and project representatives. The range of activities that the public can participate in is described in the *INEEL Community Relations Plan* (May 1995) available from the INEEL Community Relations Office (208) 526-4700 or (800) 708-2680.

### 3.1.3 Content and Organization of the Proposed Plan

11. A commenter thought that including cancer-causing elements, toxic chemicals, and risks from lead in Table 1 was confusing. Given the different kinds of uptake criteria, the commenter said, these risks could not easily be evaluated individually when the data were combined. An expanded table, or the addition of separate multiple tables, was recommended. [B2-1]

**Response:** The comment is noted and appreciated and will be relayed to future Proposed Plan writers. The table design was an effort to present the three types of data together.

### 3.1.4 WAG 4 Remediation Planning and Costs

12. A commenter referring to the \$18 million estimated cost to clean up the CFA, called it exorbitant, and wrote that this money should instead be spent at the INTEC. The commenter noted that these public tax dollars should be spent wisely. [W3-1]

**Response:** The federal government has an obligation to clean up all contamination resulting from its past activities that pose a significant risk to human health or the environment. One of the purposes of doing risk assessment is to determine which sites create risk as defined by CERCLA. The three sites to be remediated at CFA have been determined to pose an unacceptable risk to human health.

Cost estimates for the alternatives analyzed during the WAG 4 feasibility study were developed for comparison purposes only. The estimates were developed on the basis of a preliminary conceptual design. Many specific details of the alternatives are not well defined at this time and cannot be included in the estimates. Instead, these details are accounted for as a contingency cost element in each estimate. The cost estimates most likely do not reflect the actual cost of implementing an alternative. Actual project expenditures will likely be less than the cost estimates in the Proposed Plan. As the project design is finalized, the cost estimates will be refined.

More information about DOE's strategies to improve efficiency and cost saving can be found in Accelerating Cleanup: Paths to Closure (June 1998) (available from the INEEL Community Relations Office, (208) 526-4700 or (800) 708-2680, or on the internet at <http://www.em.doe.gov/closure/final/index.html>).

13. Several commenters suggested that the assumption of a one-time disposal fee is optimistic and probably has more to do with INEEL's budget than with taxpayer costs. Does this cost estimate assumption hide additional costs for use of the ICDF? [IF1-3, W8-9]

**Response:** Typically, disposal facilities charge a one-time fee. The off-INEEL disposal costs were determined by the existing contract between the INEEL and a representative off-INEEL disposal facility. The tippage fee is calculated through determining what the landfill will cost to build and maintain over its life span and then dividing that dollar amount by the amount of material that can be disposed of in the landfill. The fee paid to dump each truckload of waste is a portion of the landfill's lifetime cost.

As with the individual using the local landfill, the INEEL must pay to dispose of wastes at off-INEEL facilities. However, no fee is paid for facilities on the INEEL. This is because facilities on the INEEL are funded under a separate line item within the budget.

The Agencies realize that it is difficult to compare two alternatives when one includes a tippage fee and the other does not. If WAG 3 were to charge other INEEL users for the ICDF, the tippage fee would be approximately \$104 per cubic yard. The tippage fee for off-INEEL disposal is approximately \$300 per cubic yard. The off-INEEL disposal fee is based existing contract between the INEEL and a representative off-INEEL disposal facility.

14. One commenter stated that the Proposed Plan has a lot of fat in it. The commenter recommended that a panel of experts evaluate this project. [W3-3]

**Response:** The cost estimates provided in the Proposed Plan are rough estimates given for the purpose of comparing the remedial alternatives. As the project continues, the known factors increase, the unknowns and uncertainties decrease, and the cost estimate becomes more specific to the project. During the design phase, as schedules and specifications are developed, the cost estimates will become more precise.

The cost estimates are prepared by professional cost estimators with education and experience comparable to that of professionals in the private sector. Cost estimates for DOE sites must include worker health and safety concerns related to radiologic concerns that are not required in the private sector. (The INEEL's Cost Estimating Guide contains more information about DOE's cost estimating process. It is available at [www.inel.gov/capabilities/cost-estimating/eindex.html](http://www.inel.gov/capabilities/cost-estimating/eindex.html) on the Internet.)

15. Several comments dealt with the relationship between RCRA and CERCLA. One commenter questioned whether the distinction between a RCRA landfill and a CERCLA (Superfund) cleanup site is related to the number of years, or other concerns. [F1-1] A commenting group asked for clarification about how the various waste classification types are disposed of. Are the classifications made in terms of physical, chemical, legal, or political characteristics? Why is decontamination waste accepted for placement in the Radioactive Waste Management Complex (RWMC), but not environmental restoration waste? How do waste types accepted for the RWMC or proposed for the INEEL CERCLA Disposal Facility (ICDF) differ from those going to the Waste Experimental Reduction Facility (WERF)? [W8-3]

**Response:** Both RCRA and CERCLA establish comprehensive regulatory frameworks to protect human health and the environment from environmental contamination. However, CERCLA is the more comprehensive statute. The principal distinction between the two programs is that RCRA authorizes the safe and protective *current* and *future* management of wastes, while CERCLA authorizes cleanup responses whenever there has been a past release of wastes. The literature on RCRA and CERCLA is extensive, and this response can only address the points raised by the WAG 4 public comments. (More information about RCRA is available at <http://www.epa.gov/epaoswer/general/orientat/> on the Internet. Information about CERCLA is available at <http://www.epa.gov/superfund/whatis/cercla.htm> on the Internet.)

The term hazardous waste is defined under RCRA regulations as a waste with physical and/or chemical properties that make it dangerous to, or capable of having a harmful effect on, human health or the environment. Classification of waste types is a complicated process and has resulted in a large number of defined categories of waste, some of which are present at the INEEL (more information about the waste types can be found at <http://environment.inel.gov/tsd.cfm> on the Internet. The amount, status, and handling of the waste types are summarized in the INEEL Annual Reports available on the Internet at [http://www.inel.gov/environment/annual\\_reports/index.html](http://www.inel.gov/environment/annual_reports/index.html) .

Hazardous substances covered under CERCLA include all RCRA hazardous wastes as well as toxic pollutants addressed by other regulations. In general, contamination that contains radionuclides is covered by CERCLA but not RCR-A, and petroleum/natural gas

products are covered by RCRA but not CERCLA. CERCLA requires that on-INEEL remedies meet any legally applicable or relevant and appropriate requirements (ARARs), including RCRA, unless site-specific waivers are obtained. When hazardous wastes are transported off a CERCLA site, they are subject to full RCRA regulation: all transportation and treatment, storage, and disposal requirements under RCRA must be followed. This ensures that wastes resulting from a CERCLA activity are sent to environmentally sound waste management facilities.

Low-level waste is defined as radioactive waste that is not high-level waste, transuranic waste, spent nuclear fuel, or by-product material. Mixed low-level waste contains both hazardous materials and low-level radioactive components.

The RWMC can not accept mixed waste. The ICDF, which is part of the remedial design/remedial actions at WAG 3 at the INTEC, is planned to be a facility that can consolidate low-level waste from several areas on the INEEL, including the CFA. It will also be able to receive low-level mixed waste. A description of the proposed ICDF is contained in the ROD for WAG 3 (available from the INEEL Community Relations Office (208) 526-4700 or (800) 708-2680 or at <http://environment.inel.gov/er/erplans.htm> on the Internet.) As planned, the soil repository will be an engineered facility meeting state and federal design and construction requirements, including the RCRA requirements.

16. A commenter would like more information on disposal costs for facilities off the INEEL and the factors that lead to variability in those costs. [B2-6]

**Response:** Cost estimates are based on an existing contract with a representative off-INEEL disposal facility. The cost estimates for disposal of waste at facilities include:

- a. How a material has to be handled to prepare it for shipment (whether it must be in barrels, bags, or other containers)
- b. The waste media involved (e.g., liquid, solid, sludge)
- c. Characterization before the waste is shipped
- d. Distance from the INEEL, and whether a special route must be followed
- e. Tipping fees charged by the disposal facility
- f. Characterization required to be conducted by the receiving facility
- g. Transportation of any residuals (such as ash) back to the INEEL (including containers in which it is shipped, the waste media, special transportation routes, and characterization upon its return)
- h. Legal, procurement, and subcontracting documentation.

## 3.2 The CERCLA Process at WAG 4

### 3.2.1 Risk Assessment

17. A commenter expressed concern about worker health and safety, and asked why the current occupational scenario was not included in the Proposed Plan. [B2-2] A commenting group wrote that it was not clear why only future occupational health risks were considered in Table 1. Do future occupational risks pose current occupational risks as well? [W8-41]

**Response:** The current occupational scenario was included in the baseline risk assessment conducted as part of the comprehensive RI/FS. Risk assessment results for the current occupational scenario were not provided as a separate column in Table 1 of the Proposed Plan because risks that exceed threshold levels are managed to ensure worker health and safety (see footnote (b) in Table 1). Worker safety is a high priority at the INEEL for all operations. Safeguards used at the INEEL to ensure worker health and safety include engineered barriers, robotics, and personal protective equipment.

18. A commenting group believed the risk assessments were very inaccurate. The group stated that the risk assessments are based on the linear non-threshold theory, which has no scientific basis. [W6-1]

**Response:** Risk assessments at CERCLA sites are conducted following EPA guidance which directs use of the linear non-threshold theory. While some deviation from the guidelines is allowed based on the type of site and what contaminants are present, the baseline risk assessments typically follow these guidelines closely. Generally, the EPA guidelines produce a risk assessment that is very conservative: that is, the risk assessment tends to overestimate the risks and hazards at a site. This provides an extra level of protection for the health and safety of humans and the environment.

19. A commenting group would like information on when the future occupational scenario begins. [W8-5]

**Response:** For purposes of the risk assessment, the future occupational scenario period begins in 100 years (the year 2095) and lasts for 25 years (through the year 2120).

20. A commenting group did not understand why cumulative excess cancer risk for uranium 238 and arsenic was collapsed into one cell in Table 1. [W8-6]

**Response:** Table 1 in the Proposed Plan is a summary the results of the human health risk assessment. The information follows the guidelines set by EPA for Superfund sites. At each site, the exposure routes for each contaminant of concern are calculated and summed, and then the sums of all the contaminants are added together to find the total risk or hazard at the site. The results are presented in Table 1 of the Proposed Plan. This method not only provides the most conservative estimate of risk, but also permits comparisons between sites in each WAG and between WAGs.

### 3.2.2 Evaluation Criteria and Process

21. A commenter expressed approval that DOE is using the best currently available technology, rather than using experimental techniques. [B1-2]

**Response:** Thank you. The types of contaminants at the three sites requiring remediation are readily addressed by available technology, therefore no experimentation is required.

22. A commenting group disagreed with the general approach to remediation that leaves in place contaminants that are deeper than 10 feet below the surface. The group concluded this merely gives the contaminants a head start toward the Snake River Plain Aquifer. [W8-7, IF1-4]

**Response:** The depth of 10 feet below ground surface is used to evaluate contamination for a residential scenario in which a basement might be constructed. Contaminants at depths greater than 10 feet are inaccessible to residential receptors. Unless there is a groundwater risk from subsurface contamination, mitigative measures are not considered.

23. Several commenters disagreed with the use of the word “containment” for alternatives involving covers, since the covers are open at the bottom, the side nearest the aquifer. They contended that, although this technology prevents contamination from migrating upward, it fails to prevent migration of contaminants downward. [W8-8] One commenter also noted, however, that the containment cover described is better designed than those recommended for other INEEL remediation activities. [B1-4, B2-3]

**Response:** The comprehensive RI/FS determined that contamination at the three WAG 4 sites does not threaten the aquifer. As used by CERCLA, the term containment refers to the ability of a constructed barrier to prevent migration of contaminants along a pathway that results in exposure to human or environmental receptors. For example, if a contaminant poses a human health risk when it is inhaled, the barrier must prevent it from reaching the air.

The INEEL uses several types of containment barriers, each designed to meet the specific requirements of a contamination site. Containment with an engineered barrier is the preferred alternative only for the drainfield because it will break the exposure pathways of external radiation exposure, thus protecting human health and the environment. Groundwater simulation conducted as part of the RI/FS predicted that Cs-137, the COC at CFA-08, would not impact the Snake River Plain Aquifer above risk-based concentrations. Therefore, the cap effectively “contains” Cs-137 from the only viable exposure route, external exposure. Additionally, an evapotranspiration cover will minimize infiltration at the drainfield. (More information about engineered barrier designs evaluated in the WAG 4 feasibility study can be found in “Evaluation of Engineered Barriers for Closure Cover of the RWMC SDA” [J. F. Keck et al. January 1992] available in the Administrative Record.)

24. A commenting group supported the concept of a single, on-INEEL low-level waste disposal facility to be located at the Idaho Nuclear Technology and Engineering Center (INTEC; formerly the Idaho Chemical Processing Plant). [W6-2]

**Response:** The Agencies welcome public support of the concept of an On-INEEL disposal facility to be located at INTEC. As described in Part II Sections 12.1.1 and 12.1.3 of this ROD some materials from CFA are anticipated to be disposed at the ICDF. The development of the ICDF is itself part of the remedial design/remedial actions at WAG 3 at the INTEC.

A description of the proposed ICDF is contained in the ROD for WAG 3 (available from the INEEL Community Relations Office (208) 526-4700 or (800) 708-2680 or at <http://environment.inel.gov/er/erplans.htm> on the internet). It will be used to consolidate radioactively contaminated soil and debris from INTEC and other areas on the INEEL. Containment in an engineered facility with a liner to prevent leaching and a cap to keep out moisture will significantly reduce the threat to the Snake River Plain Aquifer, protect human health and the environment, and improve DOE's ability to effectively manage the contamination. As planned, the soil repository will meet state and federal design and construction requirements, including the RCRA hazardous waste management requirements.

The decision to locate a repository at the INEEL was driven by cost and benefits. The cost for sending the large volume of waste to a commercial off-INEEL disposal facility, including costs to transport, treat, and dispose of contaminated soil, would be extremely large, compared to the benefits to be gained. DOE estimates that locating a repository on-INEEL will save taxpayers \$377 million over the cost of shipping the contaminated soil to an off-INEEL disposal facility.

25. A commenter urged that remediation be selected when it is cheaper than monitoring. [B1-3]

**Response:** Environmental remedial options are not based solely on cost. A cleanup treatment must satisfy the two threshold criteria used in CERCLA based evaluations of remedial alternatives—overall protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements (ARARS)—before being ranked according to the five major balancing criteria, one of which is cost.

Monitoring without remedial action, though cheaper than the other alternatives, was determined not to be protective of human health or the environment.

### 3.3 Release Sites/Groups at WAG 4

#### 3.3.1 Pond (CFA-04)

6. A commenter asked for more detail about the cost estimates for Alternatives 3a and 3b. Specifically, why was there such a disparity in costs between Alternatives 3a and 3b? Was the entire scope of work considered in both cost estimates? Could the off-INEEL option have been overestimated? Is it possible to send just the soils containing RCRA-listed waste off-INEEL, and dispose of the remaining waste on-INEEL? [W4-1]

**Response:** The estimated cost differences between Alternatives 3a and 3b primarily arise from the costs of both transporting soils to and disposing of the soils at an EPA-approved off-INEEL disposal facility. The estimates were based on cost information from such a

facility. As the project design is developed and the design parameters are finalized, the alternatives may be modified. Modifications may include alternate disposal sites.

Many of the operational aspects of the selected alternatives are not finalized, but will be defined more specifically during the design phase of the project. Stabilization of waste at the pond would meet all ARARs listed in Part II, Section 13 of this ROD, including state of Idaho requirements for fugitive dust emissions.

27. A commenter stated that his professional experience leads him to question the preference of Alternative 3a, given that it has operational and cost disadvantages compared to other alternatives. [W4-1] The commenter listed, the following items for specific discussion:
- a. The requirement of substantial mixing and material setup time to allow for proper treatment.
  - b. The requirement of more personnel and equipment for a much longer period of time.
  - c. The requirement for more preparations and logistics.

The esthetic problem associated with high-volume unloading and mixing of Portland cement. The small particle size of the cement could lead to a continuous, large white cloud.

Controlling this could be expensive and/or difficult due to the INEEL's typically windy conditions.

**Response:** As presented in the Proposed Plan, alternative 3a is the least expensive of the three action alternatives considered for the Pond. Treatment of the excavated soils must be conducted in accordance with all applicable or relevant and appropriate requirements (ARARs), including those applying to fugitive dust emissions. (A complete list of ARARs that must be met for this project is contained in Part II, Section 13, of this ROD.) All treatment will be conducted in a manner to ensure the health and safety of workers and the environment.

28. A commenter felt that an easier and less expensive alternative for the pond contamination would be to dig it up and ship it off-INEEL. The commenter argued that the large volume of material would lead to price reductions. [W4-3]

**Response:** Cost estimates for off-INEEL disposal of waste excavated from the pond show that the additional shipping and transportation expenses would drive the cost of Alternative 3b to an estimated \$12.8 million—nearly double the \$6.7 million estimated for Alternative 3a.

29. A commenting group stated that the cost estimate for Alternative 4 seemed very high. The group suggested that phytoremediation could be a less costly alternative, and asked why it was ruled out as an alternative technology. [W7-2]

**Response:** Phytoremediation uses plants to extract contaminants from the soil. Contaminants generally are incorporated into the biomass (the plant). At the end of the

growing season, the aboveground portion of the plant is collected and incinerated. The residual waste (ash) is stabilized and disposed of in a suitable landfill.

The cost-effectiveness and technical implementability of phytoremediation are very site specific. Factors that affect whether phytoremediation is the best overall choice for a site include type of contaminants, concentration level, depth to which they are present, types of plants that will uptake the contaminants, and the need for additional management of plants. For instance, it is best used for contaminants that are within the upper 3 feet of soil, within the root zones of the plants used. Plants may require additional irrigation and soil amendments for optimal uptake. Treatability studies must be conducted to select the best plant species, determine contaminant extraction rates and costs, measure increased contaminant leaching due to irrigation, and other concerns.

Phytoremediation has been identified for use at the following INEEL sites:

- The Mercury Spill Area (TSF-08) in WAG 1. A phytoremediation treatability study will be conducted at the Mercury Spill Area to evaluate plant uptake factors and rates. That area is contaminated with mercury concentrations at 73.7 mg/kg to at least 2.5 feet below ground surface. (More information can be found in the Proposed Plan for WAG 1, available from the INEEL Community Relations Office, (208) 526-4700 or (800) 708-2680.)
- Five sites at Argonne National Laboratory – West (ANL-W; WAG 9) Mercury contamination at the ANL-W sites ranges from 2.62 to 8.83 mg/kg, and is limited to 2 feet below ground surface. The remediation goal for mercury at the ANL-W sites is 0.74 mg/kg. (More information is available in the WAG 9 ROD, available from the INEEL Community Relations Office.)

Mercury contamination exists in the pond bottom at areas with uneven soil thickness, which would make successful growth of the plants difficult. Also, mercury was detected at a maximum concentration of 439 mg/kg at the pond compared to 73.7 mg/kg at the WAG 1 Mercury Spill Area (TSF-08) and a maximum of 8.83 mg/kg at the WAG 9 ANL-W site. To reach the final remediation goal of 0.5 mg/kg would potentially require much more time for the CFA-04 Pond soil. Therefore, implementability of phytoremediation for the pond was determined to be low to uncertain, and the technology was screened from further consideration during the feasibility study.

### **3.3.2 Sewage Treatment Plant Drainfield (CFA-08)**

30. A commenter who worked at the CFA for many years questioned how the residue from the low-level contaminants in the hot laundry wastewater could have resulted in such a large cleanup cost. [W3-21]

**Response:** The commenter is correct in believing that very low concentrations of radionuclides were disposed of in large volumes over a long period of time at the drainfield. However, the contamination was spread out over a very large area (approximately 200 by 1,000 feet). The residues remain in the approximately 40,000 linear feet of gravel-filled trenches. The cost to cleanup the drainfield is in direct proportion to the size of the contaminated area - approximately 74,000 cubic yards.

31. A commenting group noted that, in approximately 189 years, the risks from cesium-137 contamination at the site would decrease to a level below the human health risk threshold. However, according to Title 5, cesium- 137 has a half-life of 30 years, which leads to a conclusion that the cesium-137 would decay to acceptable levels in 90 years rather than 189 years. The commenting group asked why it would take 189 years to achieve acceptable risk-based levels. [W7-3]

**Response:** A preliminary remediation goal, or PRG, is a quantitative cleanup level. PRGs are used in planning remedial actions and assessing the effectiveness of remedial alternatives. The maximum concentration of Cs-137 detected at the drainfield was 180 pCi/g. It is this concentration that would require 189 years to decay to the acceptable value of 2.3 pCi/g for residential use.

### 3.3.3 Transformer Yard (CFA-10)

32. The addition of items for information purposes throughout the text (marked with an “info” icon) was praised, with one exception. A commenting group felt that the text located under the info icon on page 20 raised unnecessary public concerns related to polychlorinated biphenyls (PCBs), particularly given the very low level of PCBs detected at WAG 4. The group stated that this info icon, in particular, was alarmist and served no purpose. [W7-4]

**Response:** A Proposed Plan is a “brief summary . . . of the RI/FS” (OSWER Directive 9355.3-02, Section 1.2.6). The Transformer Yard (CFA-10) is a fenced yard with a concrete pad that was used infrequently from 1985 to 1990 to store transformers. The area was originally named the “Transformer Yard Oil Spills” because PCB contamination from the transformers was suspected to be present. Although PCB levels were determined to be well within the threshold for industrial sites, the name was retained (with the deletion of “Oil Spills” for consistency). The sidebar discussion was appropriate to include in the Proposed Plan to acknowledge the original suspicions and inform stakeholders of the minor change in name.

33. While approving of off-INEEL disposal and the INEEL’s rapid progress toward cleanup, a commenter questioned whether the selection of off-INEEL disposal was the result of expedience or strictly environmental considerations. [B2-4]

**Response:** The Agencies believe that that the selected alternative, Excavation, Treatment, and Off-INEEL Disposal, remains the most appropriate remedial action for the CFA-10 Transformer Yard soil. As stated in the Proposed Plan, it was selected because the site could be remediated within 15 months after signing this ROD. It provides the best balance of trade-offs among alternatives in terms of the five balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness; implementability; and cost). It is cost-effective, because its costs are proportional to its overall effectiveness. Furthermore, it provides the balance of trade-offs among alternative because it emphasizes long-tem effectiveness and reduction of toxicity, mobility, or volume through treatment. Finally, selection of this alternative meets DOE’s mission of completing cleanup activities as quickly as possible.

### 3.4 Other Issues

#### 3.4.1 The Snake River Plain Aquifer/Groundwater

34. A commenting group disagreed with the general approach to remediation that leaves in place contaminants that are deeper than 10 feet below the surface. [W8-7, IF1-4]

**Response:** The depth of 10 feet below ground surface is used to evaluate contamination for a residential scenario in which a basement might be constructed. Under this scenario, residents could potentially be exposed to excavated soil. Contamination is only left in place below 10 feet in situations where groundwater modeling indicates that the contaminants and/or the concentrations will not impact the aquifer above risk-based concentrations or maximum contaminant levels.

35. A commenter reiterated that his chief concern is that contamination be removed from over the aquifer before it is too late -assuming it is not. [W1-1]

**Response:** Groundwater modeling conducted as part of the Comprehensive RI/FS indicated that the WAG 4 release sites and tank sites do not constitute an unacceptable risk to the Snake River Plain Aquifer, approximately 500 feet below the ground surface. As part of the remedy for the OU 4-12 Landfills, groundwater monitoring has been conducted for 4 years and will be conducted for 26 more years to detect potential impacts to the aquifer.

#### 3.4.2 INEEL CERCLA Disposal Facility

36. A commenting group contended that this Proposed Plan, like those from other waste area groups, selected remedial actions that require on-INEEL disposal at the proposed ICDF, and that this commitment to a facility that has not yet received public review and community acceptance is in violation of the CERCLA process. The Agencies have created a de facto approval process for an over-the-aquifer facility that the public would not accept. [F1-2, W8-10]

**Response:** The Agencies have followed all CERCLA requirements in regard to the ICDF. The ICDF was identified in the Proposed Plan for WAG 3 (the INTEC; formerly the Idaho Chemical Processing Plant), and all relevant documentation on the ICDF has been made a part of the Administrative Record. A description of the proposed ICDFs included in the recently signed ROD for the (INTEC). (Available from the Community Relations Office (208) 526-4700 or (800) 708-2680 or at <http://environment.inel.gov/er/erplans.htm> on the internet.)

## 4. REFERENCES

- BBWI, 1996-1999, INEEL Site-wide Annual Reports: Idaho Generator Reports for 1997 through 1999, Nonradiological Waste Management Reports for 1996 and 1997; and Radiological Waste Management Reports for 1996 through 1998 (available on-line at [http://www.inel.gov/environment/annual\\_reports/index.html](http://www.inel.gov/environment/annual_reports/index.html))
- BBWI, September 16, 1999, INEEL *Cost Estimating* Guide, Rev. 13 (available on-line at <http://www.inel.gov/capabilities/cost-estimating/eindex.html>), INEEL Cost Estimating Department.
- DOE, January 1997, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to their Environmental Consequences*, U.S. Department of Energy, Office of Environmental Management, DOE/EM-0319 (available on-line at <http://legacystory.apps.em.doe.gov/thestory/pdfpic.asp?doc=link>).
- DOE, June 1998, *Accelerating Cleanup, Paths to Closure*, DOE/EM-0362, U.S. Department of Energy, Office of Environmental Management (available on-line at <http://www.em.doe.gov/closure/final/index.html>).
- DOE-ID, December 4, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*, 1088-06-29-120, U.S. Department of Energy, Idaho Field Office, U.S. Environmental Protection Agency, Region 10; State of Idaho, Department of Health and Welfare.
- DOE-ID, September 1999, *Final Record of Decision: Idaho Nuclear Technology and Engineering Center*, DOE/ID-10660, U.S. Department of Energy, Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; and Idaho Department of Health and Welfare (available on-line at <http://environment.inel.gov/er/erplans.htm>).
- INEEL, May 1995, *Community Relations Plan*, U.S. Department of Energy, Idaho Field Office, U.S. Environmental Protection Agency, Region 10; State of Idaho, Department of Health and Welfare.
- Keck, J. F., K. N. Keck, S. O. Magnusson and J. L. Sipos, January 1992 *Evaluation of Engineered Barriers for Closure Cover of the RWMC SDA*, EDF-RWMC-523.
- U.S. Environmental Protection Agency, *CERCLA Overview* (available on-line at <http://www.epa.gov/superfund/whatis/cercla.htm>).
- U.S. Environmental Protection Agency, *RCRA Orientation Manual* (available on-line at <http://www.epa.gov/epaoswer/general/orientat/>)

## **Appendix A**

### **Oral and Written Public Comments**

## Appendix A

**Table A-1.** Cross-reference for individual comments and their responses.

Comment or Name and Affiliation or Organization (If provided)	Document and Comment No.	Response No(s)
Written Comments		
(b) (6)	W1-1	35
(b) (6)	W2-1	7
INEEL Citizens Advisory Board		
(b) (6)	W3-1	12
	W3-2	30
	W3-3	14
Jared Newman	W4-1	26
ONYX Environmental Services	W4-2	27
	W4-3	28
(b) (6)	W5-1	5
(b) (6)	W6-1	18
Coalition 21	W6-2	24
	W6-3	1
(b) (6)	W7-1	3
INEEL Citizens Advisory Board	W7-2	29
	W7-3	31
	W7-4	32
(b) (6)	W8-1	2
Snake River Alliance	W8-2	8
	W8-3	15
	W8-4	17
	W8-5	19
	W8-6	20
	W8-7	22, 34
	W8-8	23
	W8-9	13
	W8-10	9, 36
	W8-11	10

**Table A-1.** (continued).

Comment or Name and Affiliation or Organization (if provided)	Document and Comment No.	Response No(s)
(b) (6)	IF1-1	15
	IF1-2	36
	IF1-3	13
	IF1-4	22, 34
	IF1-5	4
(b) (6)	IF2-1	1
	B1-1	8
(b) (6)	B1-2	21
	B1-3	25
	B1-4	23
	B2-1	11
	B2-2	17
(b) (6)	B2-3	23
	B2-4	33
	B2-5	24
	B2-6	16
	B2-7	7
(b) (6)	B2-8	8
	M1-1	6

**Central Facilities Area, Waste Area Group 4**  
**Idaho National Engineering and**  
**Environmental Laboratory Public Meeting**

**Central Facilities Area Comprehensive Remedial**  
**Investigation/Feasibility Study Proposed Plan**

**August 17, 1999**  
**Idaho Falls, Idaho**  
**7:00 p.m.**

**Public Comment**

(b) (6) I'm with the Snake River Alliance.  
We will submit written comments

I think I do finally--and I do understand that CERCLA and RCRA address different concerns. I do think that the difference between a RCRA landfill and a CERCLA Superfund cleanup site is a number of years. It could be 30 years or 100 years or 1,000 years. So, in the real world, there are some similarities.

IF 1-1

IF 1 I think I finally, honestly, just now figured out the chronology for the soil dump. We signed a ROD, decide to build a soil dump, and then start working on the criteria, beyond that it's CERCLA waste. We start looking at what really is appropriate to put above the aquifer or leave above the aquifer, to move above the aquifer. The way we figure out what is appropriate to put above the aquifer is we go back through all the cleanup plans and see what we've already decided to put there. And then we figure out what is in that waste, and that is the waste that we allow in the soil dump.

IF 1-2

I think that you might have some problems with that. I'm not sure that that is the appropriate way to go about making that decision of both, whether to have one, and hat to put in it.

I think given the fact that at some point a RCRA dump becomes a Superfund site, whenever we're looking at these cost estimates and we look at the one-time disposal fee, I think that is being overly optimistic.

IF 1-3

I am becoming more nervous about this 10-foot basement scenario, that it's okay to leave pollution if it's deeper than 10 feet. As far as I can see, all it means is that you're leaving the waste that is 10 feet closer to the aquifer, and you're not ruining its head start.

IF 1-4

And that's it. I guess just one more thing. I hope I never understand DOE's version of tidy, but to read that we take powdered mercury and left it on the surface and we buried roofing material is just irrational. Thank you.

IF 1-5

Mr. Simpson: Thank you. Anyone else? (b) (6) any comments?

(b) (6) I'm the original author and inventor of the technologies which put out Chernobyl, hydrogen bleed-off system at Three-Mile Island, Charilabalnck, and also did the cap that let out LR-1 in Iraq. In putting out the eight atomic nuclear reactors, I'm still batting at 110-percent average. And I always design my own equipment technologies. And sometimes I wonder why sometimes they have so low standards in the DOE. Whereas as a private contractor, I've always tried to have higher and more-efficient standards. Thank you.

IF 2-1

**Mr. Simpson:** Anyone else?

(b) (6) I'm (b) (6) Coalition 21, and we will submit our comments in writing.

**Mr. Simpson:** With that, I would like to remind people that the comment period for this project remains open until September 4, 1999. The next time we'll be having public cleanup meetings will be in the fall of 2001 to discuss the Operable Unit 10-04 options. Operable Unit 10-04—I'm going to try to get most of these sites—includes EBR-1 and BORAX sites, the Organic Moderated Reactor Experiment, the site training facilities, the ordinance areas, and various other Waste Area Groups, 6 and 10 site.

Once again, that will be in the fall of 2001. And that is very close to the time frame that the nitrate investigation will be, and we will have a proposed plan for the Central Facilities Area.

With that, thank you for coming. Good night.

(Meeting concluded at 8:40 p.m.)

# Central Facilities Area, Waste Area Group 4

## Idaho National Engineering and Environmental Laboratory Public Meeting

### Central Facilities Area Comprehensive Remedial Investigation/Feasibility Study Proposed Plan

August 18, 1999

Boise, Idaho

7:00 p.m.

#### Public Comment

(b) (6) I just have a few short comments. First of all, I have been concerned when it comes to writing these cleanup path plans. In some of the articles I've seen involving DOE officials commenting on past INEEL activities that is in a substantial amount of revision of history going on. And it may seem to be a minor point, but I think you have to be honest about what has gone on at INEEL in the past, referring to previous research activities as resulting in contamination is definitely a euphemism.

B1-1

Basically you're talking about nuclear weapons work. This was a site that was very key in reprocessing bomb-grade uranium used to produce tritium and plutonium at Savannah River. So, I think you should be a little more honest about exactly where the contamination stemmed from.

Some other comments, in terms of good points, I like the fact that—with this particular plan, as opposed to the other plans, there is not as much, for lack of a better word, dinking with the waste like with the soil searcher with WAG that didn't pan out. At least in this case, you're looking at experimenting for the sake of experimenting. It appears that you're going forth with the best available technology even though there may not be any truly real good solutions. It appears that you've selected the best ones.

B1-2

Also, I would like you to consider—and a WAG 5 is sort of the model for this, that you look further at sites that you can potentially remediate for less of a cost than monitoring or perhaps not as a significant cost in addition to monitoring. As you stated, with the WAG 5 clean-up plan, some sites were cheaper to remediate than monitor.

B1-3

Approximately, half of the remediated activities so far in terms of Records of Decisions that have been signed involving WAGs have been essentially just a cap, very crude cap, at that, just made of soil. Whereas, with this cap, it looks like there is actually some thought into designing it for it to last for more than a few years.

B1-4

Although, of course, when you say containment, you're only talking about containment on the top and not the bottom, but at least it appears to be a better design than the previous caps.

And that is all I have at this time. Thank you.

**Mr. Simpson:** Thank you.

**Audience Member:** My name is (b) (6) and I'm the executive director of the Snake River Alliance...Thank you very much for your attention and courtesy this evening. I have a list of comments in no particular priority or flow. I'd like to comment that I found that Table 1 was confusing. And that there with you a sense for me—and I consider myself a lay reader, as a mixing of apples and oranges with a final case of lemons for the risk. It was too quick a table for looking at the risks, because we were looking at cancer-causing elements and also toxics, and lead, which is has its own particular kind of uptake criteria. So, I suggest an expansion some how of Table 1, or Table 1 like graphs in the future.

B2-1

I also felt uncomfortable with not including the current occupational scenario in this review. I am hopefully optimistic that there is careful attention being given to the workers at the Central Facilities Area, given the large number of them of 800. And that it is flagged carefully for workers' safety that the nitrates and tritium that is in the groundwater, as that investigation continues at the Central Facilities, is given careful attention, particularly in light of the recent federal revelations. We cannot be too careful with observing and protecting our workers from risk in Idaho.

B2-2

I also thank you very much for you acknowledgement that capping is not containment. It takes care of the top but not the bottom. I'm not opposed—I will speak for myself as one member of the alliance. In this case, I'm not opposed to off-site disposal and the moving forward with this particular clean-up, project as fast as possible. However, I am uncomfortable with the decision-making process that was seemingly based on expedience rather than what might be best for the environment. I pose that as a question. I don't have the answer for if it's better stored north or south 300 miles.

B2-3

B2-4

Also, I'm beginning to wonder about the waste acceptance criteria for the on-site disposal. I talked with my colleagues who were at last night's meeting, and we do continue to ask that there be good public involvement with setting up the criteria for that facility, especially in a closely affected area of the state.

B2-5

In reference to the cost analysis, this hasn't come up for quite the same way as it did this evening, but looking at the variability and the off-site disposal, I'm wondering about the cost-I need to do my homework, I guess and look at this other document, but what is driving this variability and cost for off-site disposal, I'm assuming its market driven, however, I think that we need to bring in the factor of environmental risk and the long-term lifetime cost of disposal and bring to our own awareness the values issue of the lifetime cost of past and current DOE activities.

B2-6

I also thank Erik for his informal okay for us to get some of our written comments after Labor Day because Friday I'm going on vacation. I want to forget about this for a couple weeks.

B2-7

Lastly, I would like to reiterate what my colleague (b) (6) mentioned. I find the first sentence or two of this introduction euphemistic. The 1300 dues-paying members of the Snake River Alliance are very concerned about nuclear weapons production activity, whether they are past, current, or in the future. And it feels very much like a glossing over to say research activities when we know that these activities were

B2-8

actually related to tools and instruments, great destruction to the human health and the environment both now and in their intent as weapons. Thank you.

B2-8 cont.

**Mr. Simpson:** Thank you. Any other comments? Well then, with that, I would just like to say that the comment period for this project remains open until September 4<sup>th</sup>. The next time we will be holding clean-up meetings will be about two years from now. In fact it will be kind of a horse race between this 413b investigation dealing with the nitrates in the groundwater, the Central Facilities Area, or the Operable Unit 10-04 investigation. And that investigation deals with the organic moderated reactor experiment and the site training facilities ordinance area, the Experimental Breeder Reactor 1 and Boiling Water Reactor Experiment Facilities and other site within WAGs 6 and 10. With that, thank you for coming and good night.

(Meeting concluded at 8:45 p.m.)

**Central Facilities Area, Waste Area Group 4  
Idaho National Engineering and  
Environmental Laboratory Public Meeting**

**Central Facilities Area Comprehensive Remedial  
Investigation/Feasibility Study Proposed Plan**

**August 19, 1999  
Moscow, Idaho  
7:00 p.m.**

**Public Comment**

**Audience Member:** (b) (6) executive director of environmental Defense Institute, Troy, Idaho. As I've said many times over the years, all the agencies, not only the Department of Energy but also the regulatory agencies have an obligation that when they convey information to the public that it be accurate and that it tell the whole truth and not be anything less than that.

Since DOE is the polluter, the public might even expect that they might not always tell everything there is to know that the public may need to know about what is happening in the process. But what is not acceptable, from our point of view, from the public's point of view, is that when we have regulatory agencies whose mandate is to track these things and force the law, and when they have their logo on these documents that go out to the public, we have an expectation that they do accurately reflect the whole truth and not a selected part of the truth.

Over the years, I can't say I have ever seen one of those plans go to the public that I could say accurately reflected the truth, the whole truth. That when I go and do my own research into the administrative record and look at the sampling data and find radically different numbers than is the document that goes out to the public, and I see this consistently year after year after year, it becomes a kind of problem that can't be attributed to a single oversight or a single mistake by somebody that missed something because it's too consistent. And the only thing that we're left with is that there is a deliberate effort on part of all the agencies not to be fully honest about what the extent of the problems are.

If what we found, if there were inaccuracies in the there that covered that were too low or too high, we could say, well, there is not a consistent pattern here. But there is a pattern. And the numbers are always way too low, consistently. There is a problem here.

And if you wonder about how the public responds to you and if you wonder about whether you have any credibility, you can look at this and find out why you have no credibility, why the public doesn't have any faith in this process, and why this is an empty room. I'm here because it's in my job description. That is what I do. I don't get paid for it. I'm unpaid staff. But as a member of that organization, that is what my

M1-1

board of directors has asked me to come and represent our organization so that, at least, you get some feedback from somebody telling you it's not working and we don't believe you and we don't have any faith in you, and that we don't think that you're going to do the right thing. And you can ask Ruel, a number of years ago—ask him the next time you see him. There was a meeting in Idaho Falls when Grumbly was still undersecretary, he was there. I think it was an EMAC meeting or something like that. And I went up to Tom, I said, "The only thing you guys bloody understand is a court order. You know, this is just spinning our wheels. We never get anywhere with you unless we go to court and a judge tells you that this is what you're going to need to do." And even then they ignored it. Penna almost went to jail. He was cited in contempt by the court because he never followed through on the PE EIS. And, finally, they settled it, but even then—I mean, how many years did that take, probably near a decade.

But that is the only thing you understand is a court order. I will tell you under no uncertain circumstances that that is where I'm putting my work right now. That's where I'm going to spend my time. I'm going home. Have a safe trip.

(Meeting concluded at 8:40 p.m.)

Please return  
this form by  
September 4, 1999

## What's Your Opinion?

The Agencies want to hear from you to decide what actions to  
take at the Central Facilities Area.

WAG-4 Comments

Dear Hatfield -

My comments remain consistent over the  
years. \* get the camp off the top of the Aquifer  
before it's too late - assuming it is.  
This stuff isn't going to go away - but it  
must be moved from atop this water table.  
Don't you think?

W1-1

\* Please

Best Regards -

(b) (6)

W1-1

If you want a copy of the Record of Decision and Response after turning in  
make sure you include your address!



INEEL Environmental Restoration Program

P.O. Box 1625

Idaho Falls, ID 83415-3911

Address Service Requested

111  
RECEIVED  
AUG 17 1999

FIRST CLASS  
U.S. POSTAGE  
PAID  
IDAHO FALLS, ID  
PERMIT 73

COMMENTS	
CCF	

FREE BROADCAST  
PG BOX 1347  
SUN VALLEY ID 83863-1347

*Erk Jensen 6-4373*

## Citizens Advisory Board

Idaho National Engineering and Environmental Laboratory

CAB-99-081

August 27, 1999

Kathleen E. Haine, Director  
Environmental Restoration Program  
U.S. Department of Energy  
850 Energy Drive  
Idaho Falls, ID 83401

Dear Ms. Haine:

**Chair:**

Charles M. Rice

**Vice Chair:**

Stanley Hesson

**Members:**

James Bondurant

Wynona Boyer

Ben F. Collins

Bill Davidson

Jan M. Edelstein

Dieter A. Knecht

Dean Mahoney

R.D. Maynard

Linda Milam

Ray Mink

P. Dave Rydalsch

R.J. Smith

Monte Wilson

**Ex-officio:**

Kathleen Trever

Wynne Pierre

Gerald C. Bowman

**Staff:**

Carol Cole

Annanda Jo Edlthay

Kathy Grebstad

Wendy Green Lowe

Kevin Harris

Len DeLuca

Thank you for the opportunity to review the WAG 4 proposed plan. While we realize that the public comment period is presently scheduled to end on for August 31, we request an extension until September 14 to allow the full board to reach consensus on its recommendation regarding the same at the Board meeting scheduled on that date.

Thank you for your consideration of this matter. I am in hopes that this request can be accommodated for a thorough review and response.

Sincerely,

(b) (6)

Chair, INEEL CAB

1 N E  
Stamp  
AUG 27 1999

COMMUNITY  
COUNCIL

W3-1

W3-2

W3-3

Idaho Associated Corporation • 477 Sharp Avenue, Suite 201 • Idaho Falls, Idaho 83402

Phone • (208) 522-1442 Fax • (208) 522-2531

214

http://www.idahoassoc.com

## Waste Area Group 4 Proposed Plan

AUG 24

- Comment Form -

AUG 1

*Eric Lempson*  
6-4373

This postage-paid return mail comment form is provided for your convenience in submitting written comments to DOE, EPA and the state of Idaho concerning the Central Facilities Area proposed cleanup plan. Please provide your name and mailing address if you would like to receive a copy of the Record of Decision and Responsiveness Summary that addresses public comments received on this project.

Name:

(b) (6)

Address:

(b) (6)

City:

(b) (6)

State:

(b) (6)

Zip:

(b) (6)

Reference Monday August 16, 1989 article in the Post Register "18 Million cleanup proposed for INEEL's Central Facility Area". I also understand this figure could be plus or minus 50%. It is not my intent to eliminate employment or to stop reasonable cleanup. However I believe the 18 Million is exorbitant for the CFA project. Would be more reasonable to spend this money at CFF. I have heard the money comes from the "Superfund". Regardless of the source, it comes from tax dollars and should be spent wisely.

W4-1

I am familiar with the CFA complex, having worked at the site from 1953-89. The CFA laundry as I remember handled low level radioactive contaminated anti-c's. Many of the isotopes had short half lives i.e.  $^{60}\text{Co}$  5.3 years.

W4-2

some long half lives i.e.  $^{137}\text{Cs}$ , 30 years. I can't imagine the residue from the laundry waste water being that large a project. I do not claim to be an expert on the subject of cleanup but common sense tells me this proposal has a lot of fat in it. I recommend a panel of experts evaluate this project. 18 million dollars is not a large amount of money as far government projects go but it is a large amount of money for city, county, and even state governments are concerned.

W4-3

(b) (6)

8/18/89

(continued next page)

T's

NO. 21 85-25800 PRINT & ENVIRONMENTAL RESTORATION

#### PAGE 4 COMMENTS

Jared Newman

Project Manager

ONYX Environmental Services, L.L.C.

(Formerly known as Wasta Management Industrial Services of Advanced Environmental Technical Services (AETS))

I work for a division of our company that does environmental cleanup at customer locations. Having done this for the past 16 years, I have managed various stabilization projects with the use of kiln material. I have done both "On-Site" and "Off-Site" stabilization projects. I also manage the distribution/disposal of the drum quantities of non-radioactive hazardous waste for the INEEL.

After reading the proposed plan for the CFA Disposal Pond Cleanup I was surprised there is such a difference in cost of Alternative 3a and 3b. What would make such a difference? I wonder if the entire scope of work was considered for both alternatives. Could the off-site option have been overestimated? Has there been talk of having just the "RCRA 196 cubic yards" sent for off-site disposal, and the remaining "untreated" soil disposed of on-site?

Here are some operational and cost items I would submit for consideration:

#### ON-SITE Stabilization disadvantages:

- Requires substantial mixing and material setup time to allow for proper treatment.
- Requires more personnel and equipment for a much longer period of time.
- Requires more preparations and logistics.
- High volume unloading and mixing of kiln or "Portland cement" can be a real aesthetic problem because of the small particle size (a continuous large white cloud). Controls can be used, which could be expensive and/or difficult to use due to the typical INEEL windy conditions.

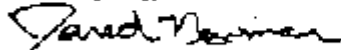
} W5-1

I have found that, in many cases it is much easier and in some cases, less expensive (all things considered) to dig it up and ship it off. With a large volume of material, prices can be reduced considerably.

Most of my work is in talking with INEEL personnel, so if anyone would care to talk to me about this or other non-radioactive remediation projects, feel free to pass my name along. I would be interested in a copy of the Record of Decision and Responsiveness Summary.

Thank You.

ONYX Environmental Services, L.L.C.



Jared Newman

3111 W. Alworth, Unit C

Garden City, ID 83724

Phone (800) 735-8266, E-mail jared\_newman@AETS



adlarmove@aol.com on 09/07/99 09:33:39 AM

To: Steven K Baker/SKB/LMITCC/INEEL/US@INEL  
cc:

Subject: Comments on CFA Proposed Plan

Message Content From Comments.htm

Sender Name

(b) (6)

Project Name  
CFA

#### Comments

I am a resident of Jackson Hole, Wyoming. There is a hysteria building here on the question of incineration of nuclear waste from your facility. Money has been raised for a concerted push against your present plan. My own view is that there is more hysteria than science here. What I would like is some arguments to counter this hysteria. Are there real dangers in the incineration process? Is the area around INEEL safe? Has there been more cases of cancer in the area of INEEL than elsewhere? There seems to be a great deal of ignorance about the science of this technology. There is also a great deal of distrust of anything the government suggests which, frankly, offends me. Could you enlighten me so that I might enlighten my neighbors. Thanks Warren Adler

INEEL  
SEP 07 1999

COMMUNITY RELATIONS  
COSTA MESA


W6-1

W6-2

W6-3

No. 15-8-6-7373  
Jan! (b) (6)

Please return  
this form by  
September 4, 1999

### What's Your Opinion?

The Agencies want to hear from you to decide what actions to  
take at the Central Facilities Area.

9/2/99

WAG & Comments

The risk assessments for WAC 3 are  
based upon The Linear No-Threshold Theory, which has  
no scientific basis. Therefore decisions based upon the  
derived risks are <sup>very inaccurate</sup> ~~inaccurate~~. Radiation safety levels  
proposed by The Health Physics Society to provide a comparison  
of risks and costs associated with the proposed actions.  
We support the concept of a single on-site disposal <sup>new</sup> ~~facility~~  
facility take located at the INTEP.  
We support the general principle of getting on with the  
deposal and remediation actions, <sup>that</sup> ~~are technically appropriate~~  
~~and a cost effective approach.~~  
The comments reflect the opinions of Coalition 21.  
If you want a copy of the Record of Decision and Reasonableness Summary,  
make sure your mailing label is correct.

[No  
comments  
this  
page]



INEEL Environmental Restoration Program  
P.O. Box 1625  
Idaho Falls, ID 83416-3971

Address Service Requested

INEEL  
RECEIVED  
SEP 10 1999

COMMUNITY RELATIONS  
COORDINATOR

FIRST CLASS  
U.S. POSTAGE  
PAID  
IDAHO FALLS, ID  
PERMIT 73

JOHN C. CHAMBERLAIN  
170 FIELDSTOWN LN  
IDHO FALLS ID 83404-7134

Thompson Coalition 21

T-2

NOTIFICATION NUMBER 1 0000 000000 00 00 000





# Citizens Advisory Board

Idaho National Engineering and Environmental Laboratory

NEEL

92-CAB-100

SEP 21 1999

September 21, 1999

Kathleen E. Hain  
Environmental Restoration Program  
U.S. Department of Energy, Idaho Operations Office, MS 3911  
P.O. Box 1625  
Idaho Falls, ID 83401

COMMUNICATIONS SECTION  
SEP 21 1999

Dear Ms. Hain

## Chair

Charles M. Rice

## Vice Chair

Stanley Hobson

## Members

James Bondurant  
Wynona Boyer  
Ben F. Collins  
Bill Davidson  
Jan M. Edelstein  
Dietrich A. Knecht  
Dean Mahoney  
R.D. Maynard  
Linda Milam  
Roy Mink  
F. Dave Rydalski  
E.J. Smith  
Monie Wilson

## Ex-officio

Kathleen Trevor  
Wayne Pierre  
Gerald C. Bowman

## Jason Staff

Carol Cole  
Amanda Jo Edelstein  
Kathy Grebstad  
Wendy Green Lowe  
Kevin Harris  
Lori DeLuca

Note: The Site-Specific Advisory Board (SSAB) for the Idaho National Engineering and Environmental Laboratory (INEEL), also known as the INEEL Citizens Advisory Board (CAB), is a local advisory committee chartered under the Department of Energy's (DOE) Environmental Management SSAB Federal Advisory Committee Act Charter.

The INEEL CAB renewed the Proposed Plan for Operable Unit 4-13A Internon Action, Waste Area Group 4 (WAG 4), Central Facilities Area at the Idaho National Engineering and Environmental Laboratory. Enclosed is a copy of the INEEL CAB's recommendation #62, addressing the Proposed Plan. The recommendation was approved through consensus by the full CAB at our September 1999 meeting. I might add that we appreciated your willingness to extend the public comment period to allow our participation.

We await DOE-ID's response to this recommendation.

Sincerely,

(b) (6)

Chair, INEEL CAB

cc: Dave Rydalski, INEEL CAB Environmental Restoration Committee Chair  
Beverly Cook, DOE-ID  
Jerry Lyle, DOE-ID  
Carol Hathaway, DOE-ID  
Martha Crosland, DOE-HQ  
Fred Buerfeldt, DOE-HQ  
Larry Craig, U.S. Senate  
Mike Crapo, U.S. Senate  
Mike Simpson, U.S. House of Representatives  
Helen Cosowath, U.S. House of Representatives  
Lauri Noh, Chair, Idaho Senate Resources and Environment Committee  
Golden C. Linford, Chair, Idaho House of Representatives Resources and Conservation Committee  
Jack Barkelough, Chair, Idaho House of Representatives Environmental Affairs Committee  
Gerald Bowman, DOE-ID  
Kathleen Trevor, State of Idaho INEEL Oversight  
Wayne Pierre, U.S. Environmental Protection Agency Region X

W7-1

W7-2

W7-3

Jason Associates Corporation • 477 Sheep Avenue, Suite 201 • Idaho Falls, Idaho 83402  
Phone • (208) 523-1662 Fax • (208) 523-3531  
<http://www.ida.net/users/jacab>



Citizens Advisory Board  
Idaho National Engineering and Environmental Laboratory

Proposed Plan for Operable Unit 4-13A Interim Action, Waste Area  
Group 4 (WAG 4), Central Facilities Area, Idaho National Engineering  
and Environmental Laboratory

W7-3  
(cont.)

W7-4

The INEEL CAB reviewed the Proposed Plan for Operable Unit 4-13A Interim Action, Waste Area Group 4 (WAG 4), Central Facilities Area at the Idaho National Engineering and Environmental Laboratory. The document was well formatted and easy to understand. We particularly appreciated the "Consumer Reports"-type tables. We have four recommendations to make on the document.

We understand that the term "interim action" is defined under the Comprehensive Environmental Remediation, Compensation, and Liability Act as any action that will not result in full remediation. We understand that some contamination sources at WAG 4 are not addressed by this Proposed Plan, hence the title of the document refers to it as an "interim action." We sincerely hope, however, that the proposed remedial actions described in the Proposed Plan will constitute final remedies for the contamination sources they are designed to address. The CAB has repeatedly expressed frustration at cleanup efforts that must be repeated, at great cost to taxpayers, because prior efforts were incomplete. The INEEL CAB recommends that all remedial actions taken at WAG 4 completely and finally address the contamination present to avoid a need for follow-on remediation.

We understand that the contaminant of concern in the Disposal Pond is mercury. We also understand that analysis (based on the Toxicity Characteristic Leachate Procedure) of sediment from three of the 38 sampling locations in the pond bottom supports a conclusion that the sediment meets the definition for hazardous waste under the Resource Conservation and Recovery Act. We question, however, why phytoremediation was ruled out as an alternative technology that could be less costly than the preferred alternative. In addition, the \$9.9 million estimate for operating and monitoring costs under Alternative 4 seems very high. The INEEL CAB recommends further evaluation of alternative technologies to reduce the costs associated with cleanup on the disposal pond.

Text describing the preferred alternative for the Sewage Treatment Plant Drainfield states that "in approximately 189 years the risks from the Cesium-137 contamination at the site would decrease to a level below the human health risk threshold." Table 5 states that Cesium-137 has a half-life of 30 years. The table leads us to a conclusion that the Cesium-137 would decay to acceptable levels in 90 years rather than 189 years. A presentation to the CAB explained the concept of a "preliminary remediation goal" which was, unfortunately, not well explained in the Proposed Plan. The document simply does not provide an adequate explanation for why it would take 189 years to achieve acceptable risk based levels. The INEEL CAB recommends clarification of these apparent discrepancies and/or inadequate explanations. We cannot support the

selection of Alternative 4 as the preferred alternative without a better understanding of how long it will take the Cesium-137 to decay to acceptable levels.

We appreciated the addition of items for informational purposes throughout the text (marked with an "info" icon), with one exception. The INEEL CAB feels that the text located under the info icon on page 20 raises a flag related to polychlorinated biphenyls (PCBs). There was no obvious need to raise unnecessary public concerns, particularly given the very low level of PCBs detected at WAG 4. The INEEL CAB recommends against the inclusion of alarmist information that serves no purpose in the document.

} W8-1

} W8-2

} W8-3



# Snake River Alliance

PO Box 1731 • Boise ID 83701 • 208/344-9101 • Fax 208/344-2305 • Email: [alliance@snake-riveralliance.org](mailto:alliance@snake-riveralliance.org)  
PO Box 4090 • Ketchikan ID 99901 • 208/728-7271 • Fax 208/728-1531 • Email: [matenwerf@snake-riveralliance.org](mailto:matenwerf@snake-riveralliance.org)  
P.O. Box 1 • Coeur d'Alene ID 83201 • 208/234-4742 • Fax 208/234-4742 • Email: [1908@earthlink.net](mailto:1908@earthlink.net)

Comments on the Proposed Plan for  
Operable Unit 4-12A Interim Action  
Waste Area Group 4—Central Facilities Area  
Idaho National Engineering and Environmental Laboratory

Snake River Alliance

October 3, 1998

The following comments and questions are submitted on behalf of the 1,300 members of the Snake River Alliance, an Idaho-based grassroots group that has monitored activities at the Idaho National Engineering and Environmental Laboratory since 1979.

The current plan doesn't seem to have any particular tricks in it (eg, soil sorter, upon shot). That's probably a good thing.

The first page of the plan says that "research activities" at INEEL left behind contaminants. The majority of contamination, certainly the most perilous, came from weapons production activities.

At the Idaho Falls public meeting on this plan, the discussion of what waste goes where highlighted an area of confusion: The waste "classifications" used for INEEL cleanup are not always physical or chemical; they are sometimes legal(istic) or even political. For example, it has never been explained satisfactorily why it's okay to put waste from decontamination in the Radioactive Waste Management Complex even though it's not okay to put environmental restoration waste there. Further, when Site officials were asked to compare the waste currently going to RWMC or proposed for the soil dump with that currently being burned at the Waste Experimental Reduction Facility, the response was that WERF is treating off-site waste. That is a political definition that does not address treatment impacts. Later clarification that WERF does not burn soils was a more helpful distinction.

Unfortunately, that brought up another source of confusion that is outside the scope of this plan but well within the scope of INEEL cleanup. BNFL officials have said on more than one occasion that the Advanced Mixed Waste Treatment Project could burn the soil from Pit 9. RWMC personnel don't necessarily seem to agree.

W8-4

W8-5

W8-6

W8-7

W8-8

W8-9

W8-10

W8-11

It's not clear why only future occupational health risks are considered (Table 1), particularly given the loose mercury-contaminated calcine. Do these not pose a current occupational health risk as well? When does the future begin for the occupational scenario?

It is still not clear why the cumulative excess cancer risk for uranium-236 and arsenic were collapsed in Table 1.

Some INEEL cleanup plans are based on the premise that it's okay to leave pollution where it is if it's already deeper than 10 feet. All that seems to do is maintain the headstart towards the Snake River Aquifer that particular contamination already has.

Please note that, even when caps seem adequate, which the one for the disposal pond does, they are not containment. Contamination is covered but left open at the bottom, the side nearest the aquifer.

Given the general acknowledgement that the only difference between a RCRA disposal facility and a CERCLA cleanup site is some number of years, the assumption of a one-time disposal fee probably has more to do with INEEL's budget than with taxpayer costs.

At the Idaho Falls meeting on this plan, I became confident that INEEL recognizes the need for some sort of public involvement in setting the soil dump waste acceptance criteria. Please pursue this matter.

Imagine the consternation caused by contemplating a two-year gap between cleanup meetings! What will we do with our time? I suggest INEEL offer quarterly briefings/meetings on all cleanup activities—progress and problems. It would be best if the Department of Energy, regulators, and contractors were all regularly available.

Respectfully submitted,  
(b) (6)

Program director